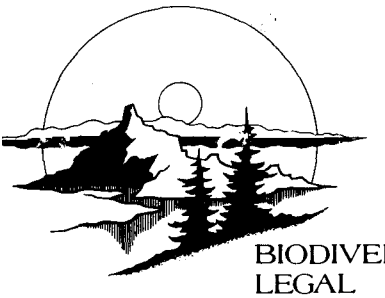

BIODIVERSITY
LEGAL
FOUNDATION

July 11, 2000

Tel: 303-926-7606
E-mail: BLFROG@AOL.COM
Fax: 303-440-0434

Jamie Rappaport Clark, Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
18th and C Streets, NW
Washington, D.C. 20240

Dear Director Clark:

Enclosed is our formal petition to list the wolverine (Gulo gulo luscus) as threatened or endangered within the species' known occupied historic range in the contiguous United States pursuant to Section 4 of the Endangered Species Act (16 U.S.C. 1531 et seq.). This petition is filed under 5 U.S.C. 553(e) and 50 C.F.R. 424.14 (1990) which grants interested parties the right to petition for issuance of a rule from the Secretary of the Interior.

We understand that this petition action sets in motion a specific process placing definite response requirements on the U.S. Fish and Wildlife Service (Service) and very specific time constraints upon those responses.

Due to the on-going cumulative threats to this rare and imperiled forest carnivore and its forest ecosystem, we urge the Service to act expeditiously upon Petitioners' request. Thank you for your consideration in this matter. We will expect to receive written acknowledgment of this petition within 30 days from its receipt by the Service.

Sincerely,

Jasper Carlton

D. C. "Jasper" Carlton
Director

Copy: Eric R. Glitzenstein, Meyer and Glitzenstein

WOLVERINE

Gulo gulo luscus

By Certified Mail

July 11, 2000

U.S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

Biodiversity Legal Foundation P.O. Box 278 Louisville, CO 80027-0278 Tel: 303-926-7606; and Predator Conservation Alliance P.O. Box 6733 Bozeman, Montana 59771 Tel: 406-587-3389; and Defenders of Wildlife 1101 14th Street, N.W. Suite 1400 Washington, D.C. 20005 Tel: 202-682-9400; and Northwest Ecosystem Alliance 1421 Cornwall Ave. Suite 201 Bellingham, WA 98225 Tel: 360-671-9950; and Friends of the Clearwater P.O. Box 9241 Moscow, ID 83843 Tel: 208-882-9755; and Superior Wilderness Action Network 2052 Carroll Avenue St. Paul, Minnesota 55104 Tel: 651-646-6277	Petition for a Rule to List the Wolverine (Gulo gulo luscus) as Threatened or Endangered under the Endangered Species Act, 16 U.S.C. § 1531 et seq. (1973 as amended) within the Contiguous United States

Contents

Introduction

The Biodiversity Legal Foundation, Predator Conservation Alliance, Defenders of Wildlife, Northwest Ecosystem Alliance, Friends of the Clearwater, and Superior Wilderness Action Network hereby petition to list as "Threatened" the Wolverine (Gulo gulo luscus) , a species native to the northerly latitudes of the contiguous United States and to designate "critical habitat" under the Endangered Species Act (ESA) within a reasonable period of time following the listing, 16 U.S.C. § 1531-1543 (1982). This petition is filed under 5 U.S.C. § 553(e), 16 U.S.C. § 1533(b) (3) (A) and 50 C.F.R. § 424.19 (1987) which give interested persons the right to petition for issuance of a rule.

Petition Context

This is a second attempt by the Biodiversity Legal Foundation and Predator Conservation Alliance (formerly "Predator Project") to petition on behalf of the wolverine for protection under the Endangered Species Act. The initial petition was filed on August 3, 1994. The U.S. Fish and wildlife Service failed to rule on the petition, so the BLF, the PCA, and the Voice of the Environment filed suit on April 13, 1995 to force a 90-day finding on the petition. The U.S. Fish and wildlife Service responded with a "not warranted" finding in which it claimed that petitioners had failed to

adequately demonstrate historical and current wolverine distribution and abundance, failed to adequately document threats, and failed to link threats to wolverine declines (60 Fed. Reg. at 19567).

Since this ruling, substantial new information has come to light regarding the conservation status and needs of the wolverine. In 1994, there had been only four field studies of wolverines in North America, including just one within the contiguous United States (Banci and Harestad, 1990; Hornocker and Hash, 1981; Magoun and Gibson, 1985; and Whitman et al., 1986). At present, six or more additional studies have been completed or are underway, most notably a study in Idaho's Sawtooth Mountains by Jeff Copeland (1996) and a current study in the Revelstoke area of British Columbia by John Krebs (1998). There are also more refined observation data on wolverine abundance and distribution within the contiguous United States owing to a compilation of wolverine observations by the U.S. Forest Service that had not yet been published at the time of the 1994 petition (Maj and Garton, 1994; Appendix D) as well as ongoing record-keeping by state Natural Heritage programs (Appendices J and K). Finally, additional material has been published on wolverine status and potential threats to the species since the original petition was filed (e.g., USFS 1994, Ruediger et al., 1999; Ruediger, 1996; Wolverine Foundation, n.d.).

In the present petition, the Biodiversity Legal Foundation, the Predator Conservation Alliance, and other copetitioners have compiled current and historical information that is relevant to demonstrating the imperiled status of the wolverine and its immediate need for federal protections under the Endangered Species Act. We propose conservation measures to be taken to protect the wolverine and its habitat as appropriate. We look forward to a thorough and fair review by U.S. Fish and wildlife Service officials within the 90 days following the date of filing as required by the Endangered Species Act and its implementing regulations.

Endangered species Act Implementing Regulations

Several sections of the regulations implementing the Endangered Species Act (50 C.F.R.) are applicable to this petition. Those concerning the listing of the wolverine as a threatened or endangered species are:

> 424.02(e) "Endangered species" means a species that is in danger of extinction throughout all or a significant portion of its range." ...(k) "species" includes any species or subspecies that interbreeds when mature.
> "Threatened species"; means a species that "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. § 1532(20).
>
> 424.11(C) "A species shall be listed. ..because of any one or a combination of the following factors:
>
> 1. The present or threatened destruction, modification, or curtailment of habitat or range;

> 2. Overutilization for commercial, recreational, scientific, or educational purposes;
> 3. Disease or predation;
> 4. The inadequacy of existing regulatory mechanisms; and
> 5. Other natural or manmade factors affecting its continued existence."

Three and possibly four of the factors set out in § 24.11(c) are applicable to the present status of the wolverine.

Sections relevant to the designation of critical habitat for this naturally sparse, diminishing species are:

> 424.12(a) (2) critical habitat is not determined when one or both of the following situations exist: ...(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Although much more is now known about the habitat needs of the wolverine than was known in 1994, nonetheless, the species still presents some uncertainties in this area. These remaining research questions should not constitute a barrier to any aspect of wolverine listing under the ESA.

> 424.12(b) In determining what areas are critical habitat, the Secretary shall consider those physical and biological features that are essential to the conservation of a given species and that may rquire special management considerations or protection. Such requirements include, but are not limited to the following: (1) Space for individual and population growth, and for normal behavior; (2) Food, water, air, light, minerals, or other nutritional or physiological requirements; (3) Cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally (5) Habitats that are protected from disturbances or are representative of the historic, geographical, and ecological distributions of a species.
> 424.14(d) Petitions to designate critical habitat. ... Upon receiving a petition to designate critical habitat.

> ..to provide for the conservation of a species, the Secretary shall promptly conduct a review in accordance with the Administrative Procedures Act (5 U.S.C.553) and applicable Department regulations, and take appropriate action.

Based on the documentation provided below, the petitioner contends that the provisions of 50 C.F.R. compel the expeditious listing of the wolverine as "threatened" or "endangered" where it occupies habitat within the contiguous United States (U.S.), and a review and appropriate action to designate "critical habitat" for the species.

Petitioners

The Biodiversity Legal Foundation (BLF) is a nonprofit, science based organization dedicated to the preservation of all native wild plants and animals, communities of species, and naturally functioning ecosystems. Through reasoned educational, administrative, and legal actions, the BLF endeavors to encourage improved public attitudes and policies for all living things. The BLF has monitored the biological status of the wolverine and worked for its conservation for more than a decade.

The Predator Conservation Alliance (PCA) is a nonprofit conservation organization based in Bozeman, Montana, which works to conserve and restore ecological integrity by protecting predators and their habitats. The PCA's geographic region of focus is the High Plains and northern Rockies of the United States.

The Defenders of Wildlife is a leading non-profit conservation organization recognized as one of the nation's most progressive advocates for wildlife and its habitat. Defenders uses education, litigation, and research to protect wild animals and plants in their natural communities. Known for its effective leadership on endangered species issues, Defenders also advocates new appraches to wildlife conservation that protect species before they become endangered. Its programs reflect the conviction that saving the diversity of our planet's life requires protecting entire ecosystems and ensuring inter-connected habitats.

Founded in 1947, Defenders of wildlife is a 501(c) (3) membership organization with more than 400,000 members and supporters. Headquartered in Washington, D.C., with field staff in Arizona, California, Colorado, Florida, Idaho, Montana, New Mexico, New York, Oregon, Vermont, and Washington, Defenders maintains a staff of wildlife biologists, attorneys, educators, research analysts and other conservationists.

The Northwest Ecosystem Alliance (NWEA) is a public interest, non-profit organization based in Bellingham, Washington. NWEA, which has over 6,000 members, is dedicated to the protection and restoration of biological diversity in the Pacific Northwest, including imperiled forest carnivores, such as the wolverine, lynx, and fisher.

Friends of the Clearwater (FOC) is a non-profit conservation organization based in Moscow, Idaho. The organization is concenred about the preservation, integrity, and biodiversity of native species and their habitat in the Northern Rockies region, particularly the wildlife and wildlands of Idaho in the Clearwater Basin and surrounding areas.

Friends of the Clearwater has been very active in issues surrounding the wolverine and its habitat. FOC has sponsored free public education presentations about wolverine in Idaho, published articles about this rare species in its newsletter, gathered wolverine sighting information from public agencies in the region, and participated in the public involvement processes that affect wolverine and their habitat.

The Superior Wilderness Action Network (SWAN) has been actively working to protect the habitat of forest carnivores such as the wolf, lynx, and wolverine for nearly a decade now. SWAN is a 501(C)(3) non-profit organization active in the Great Lakes region of the U.S.

Endangered Species Listing criteria
Applicable to the Current status
of the Wolverine

1. The present or threatened destruction, modification, or curtailment of habitat or range;

2. Overutilization for commercial, recreational, scientific, or educational purposes;

3. Disease or predation;

4. The inadequacy of existing regulatory mechanisms.

5. Other natural or manmade factors affecting its continued existence.

Overview

There are two kinds of information about wolverines which are significant for the United States and its citizens: there is the body of biological fact, and there is the American folklore. Both have meaning in the culture of the United States; unfortunately, the biological facts concerning the wolverine have been the more difficult of the two to obtain.

"The wolverine is the largest "terrestrial" member of the family Mustelidae in North America" (Copeland and Hudak, 1995). Most descriptions of the species introduce it in this way. Although it does not greatly resemble a weasel or an otter in appearance, for example, Copeland and Hudak (1995) write that the species' "movement and associated behavior are distinctly weasel-like" (p. 97).

The comparative lack of solid information about wolverines was emphasized in 1995 when the U.S. Fish and wildlife Service (FWS) rejected a petition on behalf of the species to list and protect it as threatened or endangered under the Endangered Species Act (ESA). A prominent wolverine specialist, Vivian Banci, explained: "The paucity of information [about the wolverine] is largely due to the

difficulty and expense of studying a solitary, secretive animal that is rare compared to other carnivores, and is usually found in remote places" (Banci, 1994, p. 99). "A large home range, low population density, and solitary lifestyle, combined with a wilderness habitation, has made study of the wolverine difficult and infrequent. The majority of literary references to the wolverine are either anecdotal or document incidental observations" (Copeland, 1996, p. 2). The Copeland (1996) study covered a population of wolverines in remote, mountainous central Idaho very thoroughly: "The likelihood that all resident individuals in the [the study area] had been captured was reinforced during the 1994 and 1995 trapping seasons when no new individuals were captured, photographed, or observed"(p. 30).

Adding to the difficulties of learning more about wolverines is the species' apparent distaste for human beings. Wolverines are mostly found in the wildest and most remote corners of mountain and coniferous timber country (Banci, 1994). Gulo gulo, however, is an intelligent species, and it appears that individuals may make occasional exceptions according to what might be considered individual motivation.

The 1995 FWS petition rejection, however, was followed by new wolverine research activity. Because it is the understanding of the conservation community that, although the wolverine data are by no means yet complete throughout its

range, the species is clearly imperiled in the lower United States, and much of the needed field research and survey work has been done or is in progress.

However tough and ingenious the species may be in folklore, it is no match for the set of largely human-created circumstances that currently menace it. As a matter of background to discussion of the wolverine, it should be mentioned that the species is one of four mid-sized forest carnivores presently under threat and attracting much concern from the wildlife conservation community: lynx, marten, and fisher are the other three.

> Especially disturbing. ..is that the populations of medium-sized carnivores have plummeted in nearly all of the western national parks that historically afforded them range. The causes of those declines are found both outside the boundaries of the parks and inside their borders. Although landscape-level logging is most often blamed for recent declines, several factors dating back to European settlement have also contributed. these include fur trapping, human settlement, and burgeoning numbers of recreationists. (Wilkinson, 1998, pp. 26-27)

"Both lynx and wolverine have very low tolerance for human incursion into their isolated haunts. Road building and even foot traffic along popular hiking trails can displace them from their preferred habitat" Wilkinson (1998, p. 27) added.

Although trapped to extirpation or near extirpation over almost all of its former range in the western states, comments from some state and national wildlife agency personnel suggest that they believe the species has actually extended its range in recent years. It is possible that

something of this kind may have happened earlier in this century at the times when trapping and poisoning pressures were relieved. It has also been speculated that this effect may have been produced because of a increase in human incursions into wolverine habitat which has produced more sightings.

Banci (1994) described the species as near extirpation in most states at the time when various states revised their trapping regulations.

In a comment quoted from the Western Forest Carnivore Committee meeting of June 16-18, 1998, Bill Ruediger, a well known forest carnivore authority, raised the question as to what can be done about the shrinking range of the wolverine. This has been troubling wolverine researchers for a number of years. Ruediger himself was reported to have said in 1994, when the last, unsuccessful drive for ESA listing of the wolverine was underway, that “[T]he wolverine and lynx have experienced serious decline throughout their range” (Baird, August 10, 1994). At that time, he also pointed to the reason for the great difficulty in obtaining ESA protection: “'I think the wolverine is more endangered than the grizzly bear, ...though on the verge of extinction, [they] are more widespread [than the endangered grizzly] with small populations existing in Oregon, Washington, Central Idaho and Colorado. Their distribution creates a wide potential for

land-use restrictions" (Baird, August 10-11, 1994). Although it has been suggested that managing for the ESA listed grizzly bear might benefit the wolverine, there is no decided indication that the needs of the two species coincide.

The following excerpts from a recent letter from the American Society of Mammalogists further underscores the imperiled status of the wolverine and the need for protections under the Endangered Species Act (Letter, Reichman to Forrest, January 28, 2000; also see Appendix A):

> During the past 100-150 years, the wolverine has suffered substantial loss of its original range in the contiguous lower 48 states, and has long been extirpated from its range in the eastern and mid-western United States. At present, fewer than 800 wolverines may be left in the western lower 48 states. ...The inaccessible, forested, mountainous areas of the western U.S. are the last foothold of the wolverine in the lower 48 states, and these areas are under ever-increasing pressure from developers, human recreational activities, and other human disturbances. ...Development and human access to previous inaccessible wilderness areas are increasing dramatically, leading to loss of habitat, stress to wolverines, and possible abandonment of den sites. ... It is our feeling that the wolverine may soon end up "endangered" if it isn't already, like its close relative the black-footed ferret, before more attention is paid to it. We believe that the time for action on this species is now.

It is probably safe to say that there has been no significant increase in wolverines in the U.S., given that many wildlife agency personnel have been assiduously searching for them in the last few years; a typical comment from such searchers is: "No luck."

For example, a recent (winter 1998/1999) inventory in the heart of U.S. wolverine country, the Yellowstone Ecosystem, sponsored by Turner Enterprises of Gallatin Gateway, Montana, produced no sign of the species. This finding is both ominous and significant (Duffy, letter, 8 April 1999).

The importance of wolverine study was described in plain, rather than formally scientific, terms in the following excerpt from a popular magazine article:

> At the upper end of the trophic ladder, with relatively low fertility rates, and having to cover large hunks of real estate to meet their nutritional requirements, these carnivores are often among the first species to disappear when something goes wrong with an ecosystem. ...
> Wolverines, needing solitude and space, tell us about the pristineness of an entire ecosystem.
> Consequently, these species have been likened to the miner's canary, and are called "indicator species" by some biologists as well as by the Forest Service. The concept, however, is debated. (Kerasote, 1996, p. 24)

This quotation comes from a discussion of the mid-sized forest carnivores as a group and includes the wolverine which is one of them. Because of the increasingly imperiled condition of all these mid-sized forest carnivores, they have attracted much attention, and consternation, among conservationists in recent years.

In the following document, however, the results of new efforts in the wolverine study field will be seen; indeed, this petition on behalf of the wolverine in the contiguous United States was based on sources not available in 1994 when

the last such petition was filed. Two especially prominent major studies have appeared: Banci (1994) and Copeland (1996). The authoritative Banci study, in the Forest Service's forest carnivore publication (FS Gen. Tech Report RM-254) appeared in late 1994, unfortunately too late for use in the preparation of the 1994 ESA petition. Other reports are coming in from a variety of wolverine research efforts as well.

Part I: Current Status

Part I of this petition presents what is presently known about the current status of the wolverine. Part II details the reasons for considering its protection under the Endangered Species Act.

Description of the Species

"The wolverine is the largest 'terrestrial' member of the family Mustelidae in North America" (Copeland and Hudak,1995). Although it does not greatly resemble a weasel or an otter in appearance, Copeland and Hudak write that the species' "movement and associated behavior are distinctly weasel-like" (p. 97). The wolverine has also been described as looking rather like a small bear with a bushy tail (Banci, 1994). Copeland (1996) measured adult and subadult wolverines at 15 to 30 pounds (7 to 14 kg) and 3-month-old kits at 4 to 8 pounds (2 to 4 kg).

Copeland and Hudak (1995) describe its unique markings:

> Wolverine pelage is typically a thick, glossy dark brown. A light, silvery facial mask is distinct in some individuals with a pale buff stripe running laterally from the shoulders along the animal's side and crossing the rump just above a long bushy tail. A white birth mark on the neck and chest is often prominent in some individuals while virtually nonexistent in others. White hair on the digits, feet and forelegs is not uncommon. (pp. 97-98)

These authors note some distinctive behavioral traits as well:

> Wolverines communicate through vocalizations and scent marking. A variety of vocalizations are used in the presence of conspecifics and kits [Clint Long pers. commun.]. Remote communication is accomplished via scent marking with urine and abdominal rubbing. Although wolverines have well developed anal musk glands, musking appears to be used primarily as a fear-defense mechanism and is associated with cautionary raised tail posture [Long 1987]. Contact with humans will usually elicit a vocal as well as chemical response. (1995, pp. 97-98)

Taxonomy

The distribution of the wolverine is circumpolar, covering North America and much of Eurasia, and: "Most authorities consider all wolverines in North America and Eurasia to belong to a single species (Gulo gulo) " (Banci, 1994). However, some subspecies have been proposed: Eurasian and North American populations have been termed Gulo gylo and Gulo gylo luscus respectively; the term Gulo gulo vancouverensis was proposed for the slightly varying wolverine of Vancouver Island" (Copeland and Hudak, 1995). The term G. gulo katschemakensis has been suggested for wolverines found in the Kenai Peninsula and G.g. luteus for Pacific wolverines.

Possible wolverine subspecies, however, seem to have been more debated than accepted (Copeland and Hudak, 1995). Banci (1994) noted that "Variation in body size of wolverines suggests ecotypic variation" (p. 104). The wolverine that is the subject of this petition is termed Gulo gulo luscus, referring to the North American wolverine found in the contiguous United States.

Overview of Wolverine Distribution and Abundance

Historic Distribution

Banci (1994) reviews the historical distribution of wolverines in North America (p. 102). She reports that in the western U.S. "the presettlement geographic range of wolverines extended southward from Canada through the montane ecoregions to Arizona and New Mexico (Hash 1987)." She then qualifies this statement: "However, it is not known whether these southern occurrences represent reproducing populations or dispersers." Regardless of whether the southern occurrences were breeders or lone dispersers, it is clear that wolverines have declined significantly since the time that they ranged as far south as Arizona and New Mexico. Banci affirms this decline in her conclusion to this section: "The northward retreat of wolverine distribution in the United States began in the 1840s (Hash, 1987). Today, wolverines occur in Montana, Idaho, Wyoming, Colorado, Washington,

Oregon, and California."

Regarding historical wolverine presence in the Lake States and High Plains, Banci (1994) reports:

> Wolverines are thought to have had a wide presettlement distribution in the Great Lakes region, although only in small numbers (deVos 1964). They have been absent from this region since the early 1900s (deVos 1964) and are extirpated from North Dakota, Minnesota, Wisconsin, Michigan, and Iowa (Hamilton and Fox 1987).

Banci (1994) does not discuss wolverine distribution in the eastern states but mentions the species' presence in Labrador and Quebec (Kelsall, 1981) as well as the fact that they were extirpated from New Brunswick in the second half of the nineteenth century (Seton, 1929). Other sources indicate that wolverines ranged in Maine, New Hampshire, Vermont, New York, and Pennsylvania (e.g., Hash, 1987).

Data on historical numbers of wolverines within their range are difficult to obtain, but some evidence exists that current abundance is a fraction of historical levels. Trapping records from the early nineteenth century indicate that wolverines were historically quite abundant in the state of Washington, for example. In response to an inquiry, a Washington Department of Fish and Wildlife official reported that "the Hudson's Bay Co. trapping records from 1836-53 include 686 wolverine pelts that were obtained at posts in Washington" (Letter, Allen to Jensen, February 3, 1999). The same official reported that the wolverine was probably nearly "extirpated from the state by the early 1900's."

Distribution in the Twentieth century

Data on current wolverine distribution and numbers in the contiguous United States is not comprehensive, but there is scientific consensus that 1) wolverine range and numbers have decreased dramatically since pre-Columbian times due to human activities and developments, and 2) wolverines currently number fewer than 1,000 across the lower 48 states; these occur in populations that are increasingly fragmented and isolated both from each other and from wolverine populations in Canada and Alaska.

At the continental scale, wolverines are now believed to be extirpated from the entire northern tier of the contiguous United States except the northern Rocky Mountains, and portions of the Northwest; and across the southern region of Canada from the Atlantic west to the Canadian Rockies (e.g., Hash, 1987; Appendix B). Within the contiguous United States specifically, the best available information (see state-by-state distribution below) indicates that current wolverine range has been reduced to the northern Rockies and Northwest (western Montana, Idaho, Washington State, Oregon, and Wyoming), although remnant populations may persist in the south-central Rockies (Colorado, Utah, Nevada, the California Sierras, and perhaps in the Lake States, such as Michigan, and the Northeast, possibly Maine. A close look at the remaining population centers for wolverines gives added cause

for concern because of their low densities, low reproductive rate, and the increasing isolation among the remaining wolverine subpopulations in the contiguous United States.

The last remaining strongholds for the wolverine are in western Montana and Idaho (there is no evidence of specific population centers in Washington, Oregon, or California). Fragmentation between subpopulations in western Montana and Idaho is evident according to sighting data and scientific literature (Appendix D). For example, Edelmann and Copeland (1999) describe "clusters" of wolverine sightings in Washington, Oregon, and Idaho that appear to indicate distinct subpopulations whose connectivity may be limited.

> Simple visual inspection of wolverine sightings plotted at the regional scale suggested three somewhat distinct clusters within our hypothesized distribution of wolverine. ...These clusters corresponded to the 1) northern Cascade Mountains in Washington, 2) southern Cascade Mountains in Oregon, and 3) northern Rocky Mountains in Idaho. The clusters may represent three subpopulations within a larger, spatially-structured population in the northwestern United States. ...[T]he Seven Devils Mountains may provide the only suitable habitat linking the reproducing population in central Idaho (Copeland 1996) with northeast Oregon, and also potentially with the southern Cascade Mountains. (p. 297)

Further, Groves (1988) found that wolverine sightings in Idaho are concentrated among three separate areas of the state. In western Montana, other than a contiguous area of undeveloped habitat in the northwestern part of the state, wolverines are scattered among various mountain ranges that are both naturally and artificially isolated.

Extrapolating wolverine densities across the remaining known population centers in Idaho and Montana reveals perhaps six subpopulations, ranging in size from possibly 200 to only 50 animals or fewer (Appendix D). Even if these subpopulations remain connected, the total metapopulation in the U.S. northern Rockies may number no more than 500 individuals. Another 100 individuals may be scattered across the mountainous regions of Washington, Oregon, and perhaps California, but their small numbers and isolation from wolverines in the northern Rockies and Canada may limit their contribution to the viability of the species. The low densities and negative population growth in southern British Columbia currently measured by researcher John Krebs makes it doubtful that Canadian wolverines will "rescue" populations in the United States as it appears they likely did in the past (J. Krebs, pers. comm., May 1999; Krebs, 1998; see below, "Ecological Factors, Reproduction"). Thus, due to their low numbers and their increasing fragmentation/isolation alone, the wolverine is clearly imperiled and in need of immediate protections to stem any further declines.

If low numbers and increasing fragmentation were not enough to cause concern, there is also evidence of recent declines in wolverine numbers and distribution. Wolverine observations have been reported throughout the Sierra of California until the late 1970s (Maj and Garton, 1994; White

and Barrett, 1979), but there has been no confirmed evidence of wolverines in the state during the past decade (ODFW, 1996; Appendix Q). Wolverine sightings in Oregon and Washington have been sparse in recent years as well (Appendix Q), although there have been some current observations due to intensive Forest Service surveys by helicopter (Rybeck, 1999; Appendix N). In the northern Rockies, Heritage data from Montana and Wyoming show no observations in the past decade throughout significant portions of habitat that had been wolverine occupied during prior decades (Appendices D, H, L).

Comparing wolverine numbers both historically and currently is more difficult, but sharp declines are still evident. As mentioned above, extrapolating estimated wolverine densities across the areas where they are believed to survive yields a total population of perhaps 750-800 wolverines in the United States. By comparison (also mentioned above), records of the Hudson's Bay Company indicate that some 686 wolverine pelts were collected from the Washington area alone over a 17-year period 150 years ago (1836-1853) (Allen to Jensen, February 3, 1999).

There is evidence that wolverine abundance has declined over the past few decades as well. In British Columbia, which is considered a wolverine stronghold for North America, researcher John Krebs recently reported that 500 wolverines were trapped in his province (B.C.) for three

straight years in the early 1970s and that wolverines have declined in the province ever since (J. Krebs, pers. comm., Western Forest Carnivore Committee Conference, May 1999). Data on the number of wolverines killed in Montana prior to 1984 is lacking, but Hornocker and Hash (1981) reported that many wolverines were killed by humans up until 1975 when they received state protection (specifically including an annual bag limit of one wolverine per trapper and a limited season): "The annual take has declined markedly despite the fact that some wolverines are trapped incidentally to the taking of other furbearers" (p. 1299). Today, Montana has no statewide quota on the numbers of wolverines which can be trapped between December I and February 15 each year (although only one may be taken per trapper). Nonetheless, the statewide take has averaged just a dozen animals or fewer since 1985 (Appendix M).

Current Distribution by Region and State

This section contains a state-by-state compilation of the best available information on wolverine distribution and estimates of current abundance, organized by region.

U.S. Regions

Northern Rockies and Northwestern

Estimated wolverine distribution and numbers (Appendix D) are as follows:

-Montana--An estimated 300 wolverines are fragmented between three populations centers and are found in outlying mountain ranges where they are not known to be viable;

-Idaho--perhaps 300 wolverines persist, based on research and sightings concentrated in south-central Idaho (Sawtooth, Smoky Ranges), north-central Idaho (Lochsa, Kelly Creek Drainages), and northern Idaho (Selkirk Mountains);

-Wyoming--perhaps 50 wolverines present, based on sightings in western Wyoming from Yellowstone National Park east along the Absaroka Range and south into the Wind River and Salt River Ranges;

-Washington/Oregon--perhaps 100 present, scattered across the Cascades of Washington and Oregon.

Montana

The last remaining stronghold for wolverines in the lower 48 states is in western Montana and portions of neighboring Idaho.

Sighting Data. Sighting data compiled by biologists under contract to the interagency Western Forest Carnivore Committee (Maj and Garton, 1994; Appendices C and H) and updated by the Montana Natural Heritage Program, indicate that wolverines have re-colonized most of the mountain ranges in western Montana since their historic lows in the 1920s but that their distribution may be once again in decline. There

are records from the 1990s of wolverines within the following national forests in Montana, listed here from north to south
(Appendices E, L):
-Kootenai (all portions)
-Flathead (all but the Whitefish Range and Salish Mountains
-Lolo (along the Bitterroot Divide),
-Lewis and Clark (including the Little Belts),
-Helena (including the Big Belts and the Elkhorn area, and
-Gallatin (including the Crazy Mountains, Bridger Range, Madison, Gallatin, and Absarokas).

There are records of wolverines in the following National Forest lands in Montana in recent decades, but no sightings reported in the 1990s, again listed here north to south:
-Flathead (eastern portion of the Whitefish Range, southeastern Salish Mountains),
-Lolo (south of Bob Marshall wilderness),
-Bitterroot (Bitterroot and Sapphire Mountains),
-Beaverhead/Deerlodge (Beaverhead, Pioneer, Flint Creek, Deerlodge, Gravelly Ranges).

Scientific Literature. The site of the only wolverine field study in Montana (Hornocker and Hash, 1981), wolverines are known to occupy the Swan Range and adjacent portions of

the Flathead National Forest south of Glacier National Park. Hornocker and Hash (1981) captured 24 wolverines in their study over a period of four years and estimated a minimum population size of 20 wolverines within the 13200 km2 area, or one wolverine per 65 km2. They asserted that their data indicated a stable wolverine population "on the study area proper," but because of the high mortality rates they added, "dispersal may be acting to maintain that stability" (p. 1297). Presumably the researchers were referring to dispersal from Glacier National Park and Canada at the northern boundary of their study area. Due to escalating human activities along transportation corridors between areas of secure wolverine habitat, this type of dispersal is increasingly in jeopardy (e.g., Highway 2 south of Glacier National Park; Ruediger et al., 1999, Fig. 2; Appendix S).

Other published reports of wolverine distribution over time indicate a rebounding from near-extinction in Montana from 1920 to 1940, to their current distribution across much of western Montana, including the Bear Paw Mountains south of Havre and the Sweetgrass Hills, 100 miles east of Glacier National Park (Newby and McDougal, 1964, Newby and Wright, 1955).

At the time of their writing in 1955, Newby and Wright concluded that "the wolverine is not at present threatened with extinction but instead may be increasing its numbers and

repopulating its range in Montana" (p. 253). Yet, they qualify their optimism with this caveat: "However, extensive logging operations have made rapid inroads into many areas of excellent wolverine habitat. ...If this situation continues our protected wilderness areas and National Parks will be the only areas remaining with suitable habitat for animals such as the wolverine. .." (p. 253). Logging of National Forest lands began in earnest in the 1960s and may be responsible for an apparent decline in wolverines since that time (see below, "Habitat Requirements, Protection from Human Disturbance") .

Montana Dept. of Fish. wildlife. and Parks Data. Montana Department of Fish, wildlife and Parks personnel assert that wolverine populations in Montana are stable or increasing (B. Giddings, pers. comm., 1999), but there is a lack of reliable data to support this claim. Montana still allows a trapping season, but there are too few data to be able to detect trends or to ensure that this trapping is sustainable. The data does indicate a decline from 25 wolverines trapped in 1984 to an average of about half that number over recent years, a very low number considering that the season is open for ten weeks with no statewide quota (Appendix M).

In the past decade, the Montana Department of Fish, Wildlife and Parks has conducted line transects to survey the

abundance and distribution of wolverines and other forest carnivores throughout western Montana. These efforts have met with some success, and the FWP has projected stable to increasing wolverine numbers in part relying on these data (B. Giddings, pers. comm.; Appendix M). Yet these data have not been published and the methodology used to obtain them has not been peer-reviewed. While we believe this is a commendable project that may yield valuable presence/absence information for wolverines in Montana, we believe it is limited in its ability to provide reliable estimates of wolverine population numbers or trends over time. It may be significant that the data from these surveys show significantly lower densities of wolverines than lynx, a species which has just been listed for protection as a Threatened species.

Additional Forest Service Data. Surveys of Forest Service biologists conducted by the Biodiversity Legal Foundation (1999) and Predator Conservation Alliance (1995) further confirms the distribution described above and in the attached maps (see Appendix R).

Private Survey Data. Turner Enterprises Incorporated of Gallatin, Montana conducted an intensive wolverine survey on its 120,OOO-acre "Flying DII ranch and on a portion of the neighboring Gallatin National Forest north of Yellowstone National Park. Kevin M. Duffy, Biological Technician for

this organization, reported in brief:

> We surveyed nearly one hundred kilometers, representing 29 different transects of various habitat types. I regret to report to you that in our tracking efforts this winter we came up empty as far as wolverine sign is concerned. (Duffy, letter, 8 April 1999; Appendix E)

Failure to find wolverines in this area is alarming, because it represents some of the best protected habitat in southwestern Montana with an ample prey base for wolverines (Appendix N).

Idaho

Sighting Data. As in Montana, data on wolverine sightings in Idaho were compiled by biologists under contract to the interagency Western Carnivore Committee (Maj and Garton, 1994) and were updated by the Idaho Conservation Data Center (Appendices D, H., and K). The data indicate that wolverine appear to be well distributed across National Forest lands in Idaho, as appears from recent sightings from all or portions of the following National Forests (listed here from north to south):

.Idaho Panhandle
.Clearwater
.Nez Perce
.Payette
.Salmon
.Challis
.Boise

.Sawtooth

.Targhee (including the Centennial Range and west slope of the Tetons)

.Caribou

.Cache.

There is less clear evidence of a recent decline in wolverine distribution in Idaho compared to Montana, since the only large areas with past sightings--but none during the 1990s--are the northern portion of the Caribou and the eastern portion of the Payette National Forest (Appendix D).

Scientific Literature. The scientific literature provides some added refinement to the sightings data. Wolverines are known to occupy portions of the Sawtooth, Challis, and Boise National Forests in central Idaho, the site of the only other field study done on wolverines in the lower 48 states, by Idaho Department of Fish and Game researcher Jeff Copeland (1996). Copeland (1996) captured a total of 19 wolverines and was fairly confident that he had trapped all of the wolverines within his study area (p. 30). This provided a density of one (1) wolverine per 90-248 km2 (p. 32). Copeland did not determine or even speculate about whether the wolverine population within his study area was stable.

Idaho Department of Fish and Game conducted surveys to estimate the distribution of wolverines in Idaho (Groves,

1988). The survey resulted in "10 confirmed and 89 probable reports of wolverines in Idaho between 1967 and 1987" (p. 181). The sightings were concentrated in at least three areas in Idaho: the Selkirk Mountains in northern Idaho, the Lochsa and Kelly Creek drainages in north-central Idaho, and the Sawtooth and Smoky Mountains in south-central Idaho (p. 181).

In his survey, Groves (1988) did not speculate on whether or not current wolverine populations in Idaho were stable. "[R]esults of this survey can offer no insights to the viability of wolverine populations in Idaho" (p. 184). Groves states that wolverines may be increasing in Idaho, "because more than half of the wolverine reports compiled during this survey occurred between 1980 and 1997" but qualifies this by saying, "such a conclusion may be misleading" (p. 184). As explanation, Groves refers to a Washington State study where observer effort and access to wolverine habitat has increased over time, and he notes that no surveys have ever been done before in Idaho.

Idaho Department of Fish and Game Data. In response to an inquiry, Charles K. Harris, principal wildlife Research Biologist of the Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, wrote that the wolverine in Idaho is ranked as S2: "The Snake River Basin Field Office of the U.S. Fish and wildlife Service (Boise) lists the wolverine as a watch species; it is a sensitive species with

the BLM and U.S. Forest Service Region 1 (north Idaho) and Region 4 (south Idaho)" (E-mail, Harris to Jensen, November 25, 1998). In response to another e-mail inquiry, Harris reported that trapping for wolverines was prohibited in Idaho beginning in 1965 (E-mail, Harris to Gaillard, October 27, 1999) .

Other Forest Service Data. Surveys of Forest Service biologists conducted by the Biodiversity Legal Foundation (1999) and the Predator Conservation Alliance 1995) further confirm the distribution described above and in the attached maps (see also Appendix R).

Wyoming

Sighting Data. Data on wolverines sighted in Wyoming were compiled by biologists under contract to the interagency Western Forest Carnivore Committee in 1992 (Maj and Garton, 1994) and are currently maintained by the Wyoming Natural Heritage Program. Wolverine sightings have been well distributed across northwestern wyoming, but they may no longer occur in the Wind River and Gros Ventre Ranges, because there have been no recent sightings during the 1990s in those areas (Appendices D, Hand Y). Curiously, these data include a 1991 sighting in the Medicine Bow Mountains on the southeast border of the state, but the Wyoming Department of Game and Fish has not been able to assess its reliability. Additional reported sightings include two wolverines seen by Wyoming

Game and Fish personnel in 1980, and a 38-pound male trapped on Horse Creek.

Scientific Literature. The scientific literature provides some added information. According to Banci's 1994 chapter for FS Gen. Tech. Report RM-254, the species was believed to be near extirpation in Wyoming in the 1920s; however, she reports, "Newby and McDougal (1964) believed the wolverine had expanded their range into the southwestern part of the state, as did Hoak et al. (1982). There are 100 records available from 1961 to 1991, all in the western third of the state (unpublished data in Maj and Garton 1992)" (p. 103).

Hoak, Weaver, and Clark (1982) reviewed historical literature on wolverine distribution in Wyoming and presented 50 new wolverine reports for western Wyoming, not including Yellowstone Park. These sightings are located in Grand Teton National Park as well as on and adjacent to Shoshone and Bridger-Teton National Forest lands from Yellowstone Park south as far as the southern Salt River and Wind River Ranges. They note an "apparent increase of reports" but do not attribute this to expanding wolverine numbers: instead, these reports "may reflect incrased human use of remote areas, an extension of wolverine range, or both" (p. 160). As for the overall stability of the wolverine in Wyoming, the authors merely conclude, "its status in western Wyoming remains

uncertain" (p. 159).

Wyoming Game and Fish Department Data. Recent surveys by WGFD biologists for wolverines and lynx have revealed a few signs of wolverines on the Shoshone and Bridger-Teton National Forests:

> One set of tracks was observed in Robinson Creek on the South Fork of the Shoshone River in the winter survey for 1996/97, additional reports in the past few years from the upper North Fork of the Shoshone River drainage, Blackwater Creek, and Republic Creek. ...
>
> No additional evidence of wolverines was obtained for the Forest during 1997/8 snow machine winter survey period. Information gathered for this species on the Forest during the past decade indicates a continued presence but apparently at very low numbers and scattered distribution.(USFS, 1999, p. 53)

In response to the wolverine range map and populationestimates in Appendix D, Wyoming Game and Fish Biologist Bob Luce provided some additional evidence that wolverines are rare in Wyoming (E-mail correspondence to David Gaillard, January 24, 2000):

> During lynx track surveys our personnel covered much of the potential wolverine range in the Wind River Range in Wyoming. We documented only a couple of wolverine. Even with a few reliable random observations I would say that an estimate of 100 for Wyoming is way high. Intensive lynx work in the Bridger-Teton is planned for 2000 so we have better data in a couple of years. The range map is adequate as far as I know.

Independent Data. Recent surveys conducted by independent researchers Betsy Robinson and Steve Gehman indicate wolverine presence in the northern extremity of the Shoshone National Forest just outside the northeastern entrance of Yellowstone National Park and additional wolverine

sign along the Wyoming/Montana border near the northern entrance of Yellowstone Park (Robinson and Gehman, 1998, Appendix T).

In response to an inquiry, Gary P. Beavais of the Wyoming Natural University Database reported the following information:

> [the wolverine] is imperiled and very rare in the state. However, my impression is that wolverine abundance and range within Wyoming has been slowly increasing over the last 20 years. Sightings in the Yellowstone area have increased steadily, a confirmed sighting was reported last winter from the Big Horn Mountains, and a subadult was trapped just north of Cheyenne about 2 years ago. I suspect this range expansion is due to several factors, including (1) increased year-round carrion in the Yellowstone area via gray wolf activity, and (2) decreased broad-spectrum predator poisoning over the last few decades. The Wyoming Game and Fish Dept. considers the wolverine a "species of special concern--category 3 which means essentially that extirpation appears possible but not imminent within the state" (E-mail, Beauvais to Jensen, November 16, 1998).

Beauvais believes that there is "only 1 'population' of wolverines in Wyoming, in the northwestern corner of the state.All other sightings are most likely of dispersingsubadults. (E-mail, Beauvais to Jensen, November 16, 1998). Beauvais (November 16, 1998) notes the fact that most wolverine mortality is human caused; that road density may have a direct bearing on wolverine presence; and that wolverines in Wyoming are found only in "the wilder portions of the state."

Other Forest Service Data. Surveys of Forest Service biologists conducted by the Biodiversity Legal Foundation

(1999) and the Predator Conservation Alliance (1995) further confirm the distribution described above and in the attached maps (see Appendix R).

Washington

Sighting Data. Sighting data compiled by Maj and Garton (1994) indicate that wolverines have been rare, but well distributed across Washington in recent decades. They report 1990s sightings in Mt. Baker National Forest and on the Olympic Peninsula (Appendices D and J). Also, the Forest Service is currently conducting aerial surveys for wolverines in Washington and Oregon. These surveys have confirmed tracks on the Okanogan National Forest and found possible wolverine sign on the Wenatchee National Forest in Washington (Rybeck, 1999; Appendix 0).

Washington Department of Fish and Wildlife Data. As mentioned above, trapping records from the early nineteenth century indicate that wolverines were once abundant in Washington: "the Hudson's Bay Co. trapping records from 1836 53 include 686 wolverine pelts that were obtained at posts in Washington" (Letter, Allen to Jensen, February 3, 1999). The same official reported that the wolverine was probably nearly "extirpated from the state by the early 1900s" Yet the respondent noted some evidence of a partial comeback in recent decades: "There are 28 records for the state for the period from 1970-1990. Recent aerial surveys detected 3 winter dens,

and sight, track, and photo records reported in recent years indicate that wolverine are present in low numbers" (Letter, Allen to Jensen, February 3, 1999).

Thus, current evidence indicates that the wolverine is rare but present in Washington, and if the possible natal den sightings are correct, they reproduce. According to another Washington Department of Fish and wildlife official, the wolverine is "designated 'protected wildlife' (SAC 23223-011) in the wildlife Code of Washington and has recently been added to the pool of species that are candidates for state listing" (Letter, Richardson to Jensen, November 13, 1998).

In response to the wolverine range map and population estimates in Appendix D, Washington Department of Fish and wildlife Threatened and Endangered Species Section Manager Harriet Allen provided some additional evidence that wolverines are rare in Washington (Letter, H. Allen to David Gaillard, January 26, 2000):

> -The Washington DFW wildlife Heritage Data Base currently has 105 wolverine records from 1941-1999 that are considered "probably valid," of these 38 are recent records from 1985, and five of the recent records are confirmed reports verified by a photograph or specimen (three in northern and central Cascades, one in northeastern WA, and one in the Columbia Basin in southcentral WA).

> -An additional 33 tracks and sightings reports since 1985 are considered to be probably valid, which would add support for recent wolverine occupancy of the Colville, Gifford, Pinchot, Kanisku, Okanogan, and Wenatchee National Forests.
> -It is unknown if the Washington records represent a resident population, resident individuals, or transient individuals dispersing from Canada or Idaho. .. estimates of wolverine abundance are also unknown, but it is probably appropriate to use a low density estimate such as *you* have for the Washington/Oregon Cascades.

Scientific Literature. Other evidence is consistent with these claims. Dalquest (1948) regarded the wolverine as one of Washington's rarest mammals. According to Banci's 1994 chapter for FS Gen. Tech. Report RM-254, "Johnson (1977) suggested that wolverines were present in the Cascade Range between 1890 and 1919) but absent or rare throughout the state from 1920 through 1959" (p. 103). Twenty-eight wolverines were recorded for the state between 1970 and 1990 (p. 103).

Oregon

Wolverine status in Oregon appears to be similar to its status in Washington: rare, but sightings from recent decades are distributed across the state.

Sighting Data. According to Banci's 1994 chapter for FS Gen. Tech. Report RM-254, "Kebbe (1996) referred to unverified reports that indicated that a remnant population existed in remote areas of the Cascade Range. ...There are 23 records from 1981 to 1992, compared to 57 records from 1914 to 1980" (p. 103).

Sightings data compiled by Maj and Gorton (1994) reveals 1990s sightings in the Wallowa-Whitman National Forest in the northeastern part of the state and in the Umpqua National Forest in the southern Cascades.

The Forest Service's recent aerial surveys for wolverines in Oregon confirmed tracks on the Wallowa-Whitman National Forest and possible wolverine sign was observed on the Umpqua, Malheur, Deschutes, Rogue, and Fremont National Forests (Rybeck, 1999; Appendix 0).

In response to the wolverine range map and population estimates in Appendix D, U.S. Forest Service Biologist Keith Aubry provided some additional evidence that wolverines are rare in Washington and Oregon (Letter, Aubry To David Gaillard, January 25, 2000):

> Wolverine records are especially rare in Oregon. .. there have only been 5 verifiable wolverine detections in WA since 1986 and only 2 verifiable records from Oregon during this time, one incidentally trapped in 1986 and another found dead in 1992. ...I have been involved in remote camera surveys for wolverine with biologists from the Rogue River NF and Elaine [Rybak] and Bob [Naney] have been involved in helicopter surveys for wolverine throughout the Cascade Range of WA and OR, and despite a concerted and extensive effort, thus far we have only been able to verify the presence of wolverine in north Cascades of Washington.

Oregon Department of Fish and wildlife Data. An Oregon Department of Fish and Wildlife publication on the wolverine claims the following about its current distribution:

> Occurs statewide in mountainous regions, especially in the timbered portions of the Cascade Range, Blue, Wallowa, and Ochoco Mountains. There is one recent record from Steens

> Mountain. Data are insufficient to name all counties of occurrence, but the species occurs or is suspected to occur in the following counties with some regularity: Baker, Clackamas, Crook, Deschutes, Douglas, Grant Harney, Hood River, Jackson, Jefferson, Klamath, Lake, Lane, Linn, Malheur, Umatilla, Union, Wallowa, Wasco and Wheeler. It probably wanders into adjacent counties.(ODFW, 1996)

The same publication mentions that the wolverine is listed asThreatened in Oregon under the state Endangered species Act (ODFW, 1996).

Sierra Nevada Region

There have been no confirmed reports in the Sierra of California and Nevada in the past decade, but periodic sightings are reported.

California

According to Banci's 1994 chapter for FS Gen. Tech. Report RM-254, the Wolverine was believed to be near extirpation by the 1920s, but since then has partially recovered. "Yocum (1973) believed that wolverines were becoming established in the mountainous areas of northwestern California, from 'surviving nuclei' to the north. The current range includes a broad arc from Del Norte and Trinity counties through Siskiyou and Shasta counties, and south through the Sierra Nevada to Tulare County" (p. 103). This is consistent with evidence cited by White and Barrett (1979) who estimated a population of 50-100 wolverines in the state.

Sightings data since the 1970s appear to indicate a significant decline in wolverine abundance and distribution in California. These data, compiled by Maj and Garton (1994), reveal sightings well distributed across the state up until the 1980s, but there appears to be a paucity of more recent sightings. These authors' records indicate zero records from the 1990s and only three records from the 1980s, concentrated in the southern Sierra (in or near the Sequoia and Inyo National Forests). A recent Oregon Department of Fish and wildlife publication concurs, stating: "there are no recent positive records from California, despite a concerted effort using photographic bait stations" (ODFW 1996).

A recent review of the conservation status of wolverines in California provides added testimony to its current imperiled status (Barrett et al., 1994):

> Since 1970, the number of sightings reported to the California Department of Fish and Game (CDFG) has declined, and no sighting has been verfied. In fact, there has been no specimen found nor photograph taken of a wolverine in California for more than 50 years. A research effort conducted cooperatively by the CDFG and the University of California at Berkeley attempted to locate wolverines by means of photographic bait stations, but none of the animals were photographed in either the winter of 1991-1992 or 1992-1993. (p. 93)

The same publication notes that the wolverine was classified as a rare species in California in 1971, and later classified as threatened.

In response to wolverine range map and population estimates in Appendix D, U.S. Forest Service Biologist Bill

Zielinski provided some additional evidence that wolverines are rare in California, but restoration is important and feasible (E-mail correspondence, Zielinski to David Gaillard, December 17, 1999):

> Every year there are a few believable but unconfirmed sightings of wolverine in California. California is part of the historic range of wolverine in North America and needs to be retained in any successful conservation plan for the wolverine. ...The confirmed record in so. Oregon, alone, gives us optimism that long-range movement of wolverines in Oregon will lead to recolonization of California.

Nevada

There is a lack of information on past and present wolverine distribution in Nevada. A response to an inquiry to the Humboldt-Toyabe National Forest is indicative: "This Forest has no wolverines, no research, and no management specifications." Yet it also mentions that there are "Historical, pre-1900, reference sightings of 'skunk bears' in northeast Nevada" (Letter, Anderson to Jensen, November 23, 1998).

Nevada was excluded from the Maj and Garton compilation of wolverine observations (1994). and from Banci's assessment of wolverine status and conservation needs (1994). Potentially suitable habitat in Nevada that borders occupied wolverine habitat, California to the west and Oregon and Idaho to the north, indicates that wolverines are likely to occur in Nevada, but their status is unknown.

Southern Rockies Region

The wolverine is no longer considered viable in Colorado, Utah, and New Mexico, but periodic sightings are reported.

Colorado

Sightings data compiled by Maj and Garton (1994) indicate that wolverines have been well distributed across Colorado. Recent sightings are extremely rare and are limited to the White River and pike National Forests.

Banci (1994) expressed concern that the California population may be becoming isolated and that this has already occurred for wolverines in Colorado: "Wolverines in the Colorado Rocky Mountains ecoprovince are isolated from areas to the north by the Central Rocky Mountain and Wyoming Basins" (p.104).

Presently the wolverine is classified as G4, Sl (Colorado Natural Heritage, 1998) with the comment: "Formerly populated densely forested parts of higher mountains (Armstrong 1972). Also found in alpine areas (Lechleitner 1969)," according to the Colorado Natural Heritage Program. Seventy wolverine sightings were listed by the Heritage program, the earliest in 1870. In 1965, Colorado removed the wolverine from its furbearer list and designated it an "Endangered" species in 1973. Colorado has recently proposed a wolverine reintroduction program, pending the success of a

similar program now underway for the lynx (Colorado Division of wildlife et al., 1997).

Utah

As in Nevada, there is a lack of information on wolverine presence in Utah. Maj and Garton (1994) excluded Utah from their compilation of sightings records as did Banci in her assessment (1994).

The Utah Natural Heritage description of the wolverine, classed as G4, Sl, is given in an unidentified copy of an article, which is specific to the wolverine in Utah.[1] This source reports the following:

> Possibly extirpated from Utah, but believed, based on recent (1990) sightings that are judged to be reliable, to be extant in the state. Recent evidence suggests that the species is still present in parts of the Wasatch Mountains, the Uinta Mountains, and mountains of the central part of the state (Sanpete County).

Lake States and High Plains Regions

The wolverine is believed to have been extirpated from the Lake States area by the early 1900s, from the High Plains also, apparently at some unknown date (Banci, 1994).

---

[1]This reference was a xeroxed sheet without source identification of any kind. It stated the Natural Heritage classifications of the wolverine and could have been part of a Natural Heritage publication.

Michigan

The wolverine appears to have been extirpated from Michigan prior to 1900, although the animal may have roamed the entire state earlier. The wolverine remains a sort of mascot/totem animal for Michigan residents to this day.

Minnesota

An official of the Minnesota Department of Natural Resources noted that there were no wolverines in Minnesota; probably there never had been many ("No authentic observation for 30-40 years," "extremely rare in old trapping records") (pers. comm., n.d.).

It is said that wolverines continue to be reported from time to time in the northeastern part of the state. It appears that a wolverine augmentation/reintroduction program under the FWS and Forest Service (FS) was not carried out owing to lack of state cooperation.

Wisconsin

In response to an inquiry an official of the Wisconsin Department of Natural Resources stated that the wolverine was "extirpated" in that state--"None present so no threats" (Letter, Wisconsin Department of Natural Resources, Bureau of Endangered Resources, November 7, 1998). Wolverines are known to have occurred historically in Wisconsin (e.g., Jackson, 1961).

North Dakota and South Dakota

It is reported that historical records of wolverines exist, but that no sightings have been recently confirmed in either state.

Northeastern U.S. Region

Although Banci (1994) wrote that, broadly, wolverine range extended across North America from the 38th parallel northward, it appears to be unknown when the species disappeared from the northeastern states area.

Canada

The Committee on the Status of Endangered wildlife in Canada (1998) lists the eastern and Labrador wolverine populations as "Endangered." The western populations are listed as "Vulnerable."

Ecological Factors AffectingWolverine Status

The wolverine has several notable ecological traits that affect its ability to survive and recover in areas where it has faced severe declines or extirpation: large home range requirements, a slow reproductive rate, and a sensitivity to human disturbance, particularly during reproductive denning.

Home Range

Virtually all authorities agree that the wolverine is a wide-ranging animal that needs a large home range to meet

its needs. Home range is the territory ranged by an animal in the process of obtaining its needs for food, shelter, and mates. Predators need comparatively large home ranges to provide space, in a manner of speaking, for the "home ranges" of its prey species. Wolverines, it appears, exist at even lower densities than other mid-sized carnivores (Banci, 1994). Perhaps one reason wolverines need more living space than most predatory species is because of the extra step between the wolverine and many or most of its meals; as a scavenger, it needs a predator to bring down the larger game that usually constitutes most of its winter diet: "Not a hunter, [the wolverine] depends on wolves and other predators to provide carrion" (Banci, 1994, p. 100). Wolverine diet can also be provided by avalanches, starvation, and other factors.

How much space does a wolverine need to meet its needs? Banci (1994) wrote: "Home ranges of adult wolverine in North America range from less than 100 km^2 to over 900 km^2. ...The variation in home range sizes among studies partly may be related to differences in the abundance and distribution of food" (Banci, 1994, p. 117). She goes on to cite the wolverine situations in "the southwest Yukon and in southcentral Alaska" and the differing situation in salmon spawning areas (Banci, 1994, p. 117). "In northwest Alaska, food levels were particularly low and dispersed because of the absence of overwintering caribou and home ranges of

wolverine were larger than all others reported (Magoun, 1985)" (Banci, 1994, p. 117). Thus, comparatively small home ranges may reflect more abundant food sources, larger ones scarcer food.

Copeland (1996) noted the results of important telemetry studies:

> [These] varied from 1 wolverine/48 km2 in arctic Alaska(Magoun 1985) to 1/177 km2 in Yukon (Banci (1987). Hornocker and Hash (1981) reported a density of 1/65 km2 in northwest Montana. ...Reliable estimates from such data require an accurate and long-term accounting of residency status, age and sex structure, and familial relationships of study animals (Hornocker and Hash 1981, Magound 1985). Copeland, 1996)

Copeland's (1996) central Idaho study indicated the following home ranges for his specific study population in central Idaho: "Home range size varied greatly among females ...Annual home ranges of resident adult females. .. averaged 384 km^2.". ..Home ranges of females with kits in central Idaho were 42% smaller than home ranges for unaccompanied females. .." (p. 49). "Annual home ranges for resident adult males. ..averaged 1,522 km^2" (p. 52). Copeland (1996) used his home range estimates to derive the density of wolverines within his study area and found: "Home ranges of Idaho wolverines remained stable in size among years while the observed density of resident individuals varied" (Copeland, 1996, p. 31). Copeland (1996) made some elaborate calculations that took into account adult females, the probable number of juveniles accompanying females

in addition to the number of subadults the area could support, and the resident male. "Dividing the home range area of the resident adult females by the potential number of residents provides a density estimate of 1 wolverine/90-113 km^2. A more conservative estimate may be based on the 1,980 km^2 total home range area of the resident male. This produces a density range of 1 wolverine/198-238 km^2" (Copeland, 1996, p. 32). Preliminary data from John Krebs' wolverine study in British Columbia found a similarly low density of 1 wolverine per 200-220 square kilometers (J. Krebs, pers. comm., Western Forest Carnivore Committee Conference, May 2000).

Overall, Copeland described the wolverine home range feature:

> "The wolverine may have larger spatial requirements than energetics alone would predict. Home ranges appear more stable in populations subjected to the least intensive harvest, displaying some level of intrasexually exclusive home ranges (either seasonally or within a sex class) (Gardner 1985, Magoun 1985, Banci 1987) as generally predicted for wolverine (Powell 1979, Sandell 1989). Such a spatial structure likely requires established tenure of individuals. Home ranges of Montana wolverines overlapped between and within sexes possibly due to a consistent harvest removal of individuals. The relationship between home range size and animal movements predicts resource (either food or mates) availability as a causal effect (Macdonald 1983, Swingland and Greenwood 1984, Sandell 1989)" (Copeland, 1996, p. 4).

However, Copeland (1996) qualified his conclusions: "The factors that control spacing and movements in the wolverine are unclear and some inconsistencies with this hypothesis are evident" (p. 4).

Reproduction

Wolverines are not prolific reproducers: "Reproductive rates are low and sexual maturity delayed, even in comparison with other mammalian carnivores" (Banci, 1994, p. 108). Years when food is scarce may inhibit litter production if females are in poor nutritional condition (Banci, 1994). Some observers have speculated that lack of suitable denning habitat may also inhibit reproduction.

"Wolverines exhibit delayed implantation, during which development of the embryo is arrested at the blastocyst stage. Implantation in the uterine wall can occur as early as November (Banci and Harestad 1988) or as late as March (Rausch and Pearson 1972)" (Banci 1994, p. 104). Copeland (1996) reported low kit production:

> Three females. ..produced no documented litters during 3 reproductive seasons, while 3 females. ..produced 5 documented litters in 7 reproductive seasons for an overall reproductive rate of 0.50 litters/female/year. Number of individual kits/female was calculated from 4 females that produced 8 kits in 9 reproductive seasons for a rate of 0.89 kits/female/year. (Copeland, 1996, p. 35)

Banci (1994) cites several authors (Banci and Harestad, 1988; Liskop et al., 1981; Magoun, 1985; Rausch and Pearson, 1972; Liskop) indicating that females do not produce litters every year. Copeland (1996) found that "Litter size is normally 2 to 4 kits born in late winter or early spring (Wright and Rausch 1955, Rausch and Pearson 1972, Magoun 1985)" (p. 33). Banci (1994), discussing low kit production, noted "The

incidence of nonpregnant females appears to be related to nutritional status and the demands of lactation" (p. 105).

More recent data from John Krebs' wolverine study in British Columbia also indicate low reproduction and survival rates. Krebs' study found that 19 females produced just eight kits (0.42 kits/female/year) (pers. comm., Western Forest Carnivore Committee Conference, May 2000). This is low compared to reproduction rates found in other studies (Krebs and Lewis, 1999).

> In Idaho, Copeland (1996) documented a reproductive rate of 0.67 kits/female/year; Magoun (1985) in NW Alaska reported 0.69 kits/female/year. Our present estimate of 0.43 kits/female/year is lower but is based on a low sample size. (p. 16)

Krebs' preliminary data indicate an estimated population of just 24 to 26 animals within his study area, with an annual survival rate of 0.77 (95% CI: 0.66-0.88) for all age and sex categories combined, giving him cause for concern (Krebs and Lewis, 1999).

> Magoun (1985) suggested that annual survivorship need be 0.906 or greater for a hypothetical wolverine population in NW Alaska to be stationary or stable. Our estimate of 0.77 falls well below this threshold which may indicate a decline. (p. 16)

Hornocker and Hash (1981) reported low reproduction as well:

> We know. ..from our capture-recapture data, that not all females produce young every year or every 2 years. Female No. 11, captured in 3 successive years, did not have young or appear pregnant; the same was true forothers captured in subsequent years. In fact only two of the eight females mature at the time of first capture

> appeared pregnant. Therefore, we believe that no more than half the females present on our study area were reproductively active in each of the five years of our study. (p. 1297)

Denning

Wolverine denning is a subject of rising interest to researchers and managers, since it now appears, increasingly, that denning is a critical limiting factor: "Protection of natal denning habitat from human disturbance may be critical for the persistence of wolverine" (Wolverine Foundation, n.d., p. 9, Appendix W). Females go to great lengths to avoid disturbance to their natal dens by humans and other predators, and the availability of secure denning habitat may be of the greatest importance to the species (Wolverine Foundation, n.d., p.11;). Human disturbance near a wolverine den may result in abandonment of the den and removal of the kits to what is probably a less suitable site (Banci, 1994).

> "Information on the use of natal dens in which the kits are born by wolverines in North America is biased to tundra regions where dens are easily located and observed. These natal dens typically consist of snow tunnels up to 60 m in length. Northern European dens have been noted in boulder fields and talus slopes. ...Natal dens may be located near abundant food, such as cached carcasses or live prey (Haglund 1966, Rausch and Pearson 1972, Youngman 1975)" (Banci, 1994). Wolverine dens, in the northern hemisphere have included hollow trees, holes under tree roots, overturned trees. "Rarely, kits have been found relatively unprotected, on branches and on the bare ground. ...abandoned beaver lodges. ..old bear dens, ...creek beds, under fallen logs, under the roots of upturned trees, or among boulders and rock ledges" (Banci, 1994).

Copeland (1996) found a preference for dens near talus slopes and boulder fields that allows burrowing through the snow to reach under-snow spaces among the rocks.

John Krebs, a well-known wolverine authority involved in an ongoing wolverine study in British Columbia has found wolverine den sites in the same places as in previous years; he does not believe "microsite structure for dens" was a selection factor; however, the availability of forage for the kit rearing phase undoubtedly was (pers. comm., 1998).

> The main source of winter food appears to be carrion from avalanches (mountain goats, caribou in particular) or other predators, and porcupines. He thought the spatial separation from other predators such as wolves and cougar may be an important reason why wolverines choose high elevations. ...[I]t appeared they might visit kills but very briefly. Small prey items are safer and easier to transport back to the den site. He said the most important non-winter prey was hoary marmots and ground squirrels" (Krebs, personnel communication, 1998).

More recently, Krebs has also expressed concern about the potential threat to wolverine denning habitat from growing recreational activities, especially helicopter skiing and snowmobiles. Krebs recently described the conflict between denning female wolverines and helicopter skiing in British Columbia as "inevitable." He related a discouraging incident of heli-skiing operation that led clients directly around and over a female's natal den, first unwittingly, but several additional times knowing that the den was present. Preliminary data indicate that the skiers displaced the female 10-15 kilometers, and the fate of the kits is unknown (pers.

comm., Western Forest carnivore Committee conference, June 2000).

Copeland (1996) subclassified wolverine dens as "Natal," "Maternal, and "Rendezvous" dens. The apparent reason for this is that female wolverines move their kits fairly readily--especially in cases of human disturbance of the denning area. This is consistent with information compiled by Banci (1994): "If females are disturbed they will move their kits, often to what appear to be unsuitable den sites. "

While the kits are still too young to travel, the female leaves them in a "rendezvous site" and forages alone. "Wolverine mothers go to great lengths to find secure dens for their young, suggesting that predation may be important" (Banci, 1994).

Other ecological factors, such as the kits' fast rate of growth and the age of first reproduction may depress the reproduction rate of wolverines as well. Kits are weaned at 9-10 weeks (Banci, 1994), and grow at a faster rate than many other mammals, reaching adult size by seven months of age (Banci, 1994, citing Magoun, 1985). "Iverson (1972) suggested that the rapid increase in total heat production during the early phase of growth resulted from a faster growth of the high energy-producing tissues compared to other mammals. .. .[This, in turn, "places high energetic demands on mothers

and can affect female reproduction in the immediate future" (Banci, 1994). Regarding their age of first reproduction, female wolverines do not breed during their first summer while males remain sexually immature until after their first two years (Banci,1994).

Dispersal

Successful dispersal by juveniles appears to be a critical factor to survival and recovery of wolverine populations. In its favor, the wolverine has legendary ability to travel vast distances through rugged terrain; no doubt this was critical to its recolonization of western Montana and Idaho from historic lows at the turn of the century. Copeland (1996) reported the following regarding wolverine movements and dispersal:

> Wolverines are capable of traveling over 30 km/day. ... Four male wolverines dispersed at sexual maturity, with 2 emigrating distances greater than 185 km. ...Magoun(1985) reported a 300 km movement of an unknown age female. Idaho wolverines also traveled extended distances (Table 3.3.) with 3 individuals traveling over 200 km in apparent dispersal attempts. (pp. iv, 12, 87)

This ability and behavior with regard to dispersal can also be disadvantageous to the wolverine, since a dispersing wolverine is typically more vulnerable to mortality caused by people and other predators. Copeland (1996) notes: "Dispersal carries a high risk of starvation or predation and data on the fate of dispersing individuals are scarce" (p. 91). Also, without reproduction, even successful dispersal

of individuals may not be sufficient to decolonize vacant habitat. Females are far less prone to dispersal than males and tend to establish their territories within or directly adjacent to their mother's territories (Banci, 1994). Due to these factors, incremental fragmentation of reproducing populations may be a limiting factor for wolverine persistence in many portions of its former range.

Habitat Requirements

The specific habitat needs of the wolverine are not well-defined, but there is scientific consensus on several basic parameters described below. Of these, the latter three have been severely compromised by human activities and developments: large areas containing ample prey free from human disturbance, security of natal den sites in particular, and ability to travel between subpopulations.

Habitat Preferences

The literature indicates that the wolverine is an adaptable, intelligent animal that makes use of a variety of habitat types to meet its needs. Yet the wolverine does not use just any available habitat.

> Broadly, wolverines are restricted to boreal forests, tundra, and western mountains [in North America]. The vegetation zones (Crowley 1967; Rowe 1972; Hunt 1974; Bailey 1980; Allen 1987) occupied by wolverines include the Arctic Tundra, Subarctic Alpine Tundra, Boreal Forests, Northeast Mixed Forest, Redwood Forest, and Coniferous Forest. They are absent from all other vegetation zones, including the prairie, deciduous, and

> mixed forests of eastern North America; California grassland-chapparal; and sagebrush and creosote scrublands. (Banci, 1994)

The Wolverine Foundation offers a broad summary of wolverine habitat characteristics:

> Vegetative characteristics appear less important to wolverines than physiographic structure of the habitat. Montane coniferous forests suitable for winter foraging and summer kit rearing may only be useful if connected with subalpine cirque habitats required for natal denning, security areas, and summer foraging. (n.d., p. 9, Appendix W)

This general description delineates common wolverine habitat in the U.S. but overlooks the fact that denning habitat often occurs in other locations as well. An additional factor in habitat selection is that male wolverines tend to live in the vicinity of females, and females reside in the vicinity of usable denning habitat, the selection of which, in turn, maybe governed by the availability of food.

> Home range size is generally presumed inversely correlated with the availability of resources following the contention that food controls female dispersion while the spacing of males is tied to the distribution of females(reviewed in Gittleman and Harvey 1982, Macdonald 1983, Sandell1989). (Wolverine Foundation, n.d., p. 6, Appendix W).

Banci's (1994) assessment concurs with The Wolverine Foundation's (n.d.) summary above: "habitat is probably best defined in terms of adequate year-around food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations (Kelsall 1981)" (p. 114). She qualifies this finding by

pointing out that while this is generally true at the landscape scale, stand-level habitat use by wolverines in forests has not been adequately investigated (Banci, 1994, p. 114) .

Copeland's (1996) study analyzed his study area for cover types and did find some wolverine cover preferences: Broadly, "[a] significant preference for rock habitats was evident in summer and montane coniferous forest types in winter" (p. 120). Other features noted were: "Northerly aspects were preferred in both summer and winter," "Preference for higher elevation habitats during summer may be related to the availability of prey species (Gardner 1985, Whitman et al. 1986) or human avoidance (Hornocker and Hash 1981), while lower elevational forest types commonly associated with wild ungulates likely provide the highest carrion availability"(p. 124).

> Large areas of medium or scattered mature timber accounted for 70% of all relocations. The remaining location sites were in ecotonal areas, small timber pockets, rocky, broken areas of timbered benches. Areas of dense, young timber were used least. ...Cover provided by mature or intermediate timber is also important in habitat selection. Wolverines appear reluctant to cross openings of any size such as recent clear cuts or burns. Tracking revealed that wolverines meandered through timber types, hunting and investigating but made straight-line movements across large openings. Tracks further indicated they often ran or loped across such openings. (pp. 1291-1299)

As a result of their findings, Hornocker and Hash's(1981) recommendations are against current forest practices, not always because of the habitat changes they produce, but

primarily because of the associated human activity.

> Clear cuts have altered the nonwilderness portion [of our study area] substantially (see Ramirez and Hornocker, 1981). ...In such habitat manipulations, however, with wolverine ecology in mind, consideration should be given to size, shape, and aspect of individual clear cuts. .. .Further, use of roads built in logging operations should be strictly regulated, particularly in winter. ...In winter and early spring. ..human access on snowmobiles and all-terrain vehicles could bring about disturbance and conflict, not to mention ease of access for fur trappers. (p. 1300)

Foraging Needs

"Opportunistic feeder" is the usual description of the species' food habits; more polysyllabically, it can be called a "polyphagous mustelid"(Copeland, 1996, p. 102). However, the wolverine is predominantly a scavenger whose major diet consists of large ungulates. "Not a hunter," says Banci (1994) "it depends on wolves and other predators to provide carrion, and contrary to legend, is at times killed by these carnivores" (p 100). Remarkable olfactory ability is an attribute of the wolverine, and tales of the animal smelling out carrion under two or three meters of snow are common. Copeland (1996) relates that "[a]t a site near the Emma Creek trap a wolverine excavated an egg carton and sardine can from under 2 m of snow" (p. 100).

In addition, especially in summer, the wolverine can predate efficiently, making use of a diet of smaller animals, such as squirrels, ground squirrels, snowshoe rabbit, and, at high altitudes, marmot (Banci, 1994). Like the bears,

wolverines eat berries in season. Predation of smaller animals may occur when they are available and larger carrion is not. Banci suggested (1994), however, that the species may be too large to subsist entirely on such a diet. Whether wolverines can take prey away from wolves and bears or not (as legend asserts), it is possible that they may predate large ungulates themselves in deep snows where the larger animal is at a disadvantage (Banci, 1994).

As a result of scat and foraging site collections, 35% of these associated with natal and kit rearing dens of two adult females, the following percentages of diet content from the specific Idaho population were obtained (72% collected in winter, Copeland writes [1996]):

> Ungulates, both wild and domestic, were the most common food item, representing 45.8% of all occurrences. ... Ungulates comprised 44.4% of summer and 46.3% of winter occurrences. ...Small mammals (all rodents and lagomorphs) were the second most common item occurring at 20.7%. Carnivore species comprised 20.1% of occurrences with marten, skunk (Mephitis mephitis) and black bear present in small numbers in both summer and winter collections. Vegetative items comprised 25.6% of occurrences with conifer needles making up 80.8% of the vegetative sample. Insects, primarily ants, occurred at 5.9%, while soil and gravel, and man-made plastics and fibers were present at 6.4% and 1.9% respectively. (Copeland, 1996, pp. 101-102)

Copeland (1996) also documented two wolverine caches. It appears that the animal does hide food for future use.

Protection from Human Disturbance

The level of human activity is clearly a primary factor for wolverine habitat (Banci, 1994). "within its geographic range, the wolverine occupies a variety of habitats. However, a general trait of areas occupied by wolverines is their remoteness from humans and human developments." Wolverines are known to be associated with large areas that have little or no human use. For example, to build a road into a previously roadless area will negatively affect wolverines. Banci (1994) wrote:

> Refugia, large areas that are not trapped and free from land-use impacts, can serve as sources of dispersing individuals and have been shown to be effective at ensuring the persistence and recovery of fisher and American marten populations (deVos 1951, Coulter 1960). The persistence of wolverine populations in Montana, despite years of unlimited trapping and hunting, was attributed solely to the presence of designated wilderness and remote, inaccessible habitat (Hornocker and Hash 1981). Wolverines persisted in southwestern Alberta despite their extirpation elsewhere in the province, largely because of the presence of large refugia in the form of national parks"(Banci, 1994, p. 108).

Empirical data from an extensive wolverine field study currently underway provides added evidence for the wolverine's need for areas remote from human activity and disturbance:

> All dens have been found within roadless, tributary valleys in the ESSFvc biogeoclimatic subzone under woody debris or a combination of woody debris and large boulders. ...Four of the seven den sites were located in National Parks. ...Overlay techniques clearly demonstrate that high use areas ("peaks") are found in protected areas in greater proportion than expected based on relative trapping effort and park areal extent. Protected areas comprise approximately 20% of the study area; include approximately 11% of the high trapping

> effort area (25% contour), but contain over 68% of the high use area. ...(Krebs and Lewis, 1999, pp. 11, 1415)

Based on these observations, Krebs and Lewis conclude:

> National Parks and unroaded wilderness areas appear to act as refugia at present. Pressures from commercial backcountry use, snowmobiling and logging may erode the capacity of these areas to support wolverine, particularly reproductive females. (Krebs and Lewis, 1999, p. 20)

As added evidence that wolverines need areas free of human disturbance, there seems to be no wolverine crisis in the circumpolar tundra and taiga, still comparatively inhospitable to human intrusion. For example, the following response to an inquiry came from Ontario:

> There are currently no significant threats in Ontario to populations of wolverines. However, forest management plans envision increasing utilization of these northern boreal forests. Trapping pressure is very light. ...Given that the wolverine's former range has been drastically reduced by such factors as trapping, human settlement and reduced bison herds (as well as other prey species), it is safe to say that wolverines prefer to live well away from any form of human occupancy/utilization of the land. ...This is not a problem in over half of Ontario at present. ...In combination with such protective measures as eliminating wolverine harvests and limiting timber operations to small cut-overs, it is clear that to ensure a viable reproducing population large tracts of isolated land are necessary. (Heydon, February 3, 1999, Letter to J. Jensen).

Current data on wolverine distribution and roadless areas in the northern Rockies shows a remarkable correlation between the two: every area of the northern Rockies that is believed to be currently occupied by wolverines also contains an inventoried roadless area (Appendix L).

Yet Banci (1994) also noted some inconsistencies in the general truth that wolverines are intolerant of people:

> Human presence alone is not a deterrent to the presence of wolverines, as evidenced by their feeding in garbage dumps in northern Canadian communities. If large tracts of undeveloped and unroaded habitat are essential, why do wolverine occur in the logged forests of the Sub-Boreal Interior of British Columbia and in the habitats crisscrossed with seismic lines on the Boreal Plains? (pp.100-101)

The overall literature considered, it seems plausible that absolute avoidance of human beings may be critical primarily in the denning phases. At other times, it may be best summed up that although wolverines do not court human society, they do seem to follow food; and humans do keep food stores.

Protection of Denning Habitat

We also know that wolverines are extremely sensitive to human disturbance at their natal den sites, and human disturbance of these areas via snowmobiles, helicopters, skiing, or snowshoes is harmful to wolverines. Recent research (Copeland, 1996; Krebs and Lewis, 1999, 1998) has reiterated the sensitivity of wolverine denning habitat and the fact that it must be undisturbed and almost without exception is found far from human occupation. Copeland (1996) discusses the sensitivity of females with young to human disturbance:

> Females in arctic Alaska remained at a single den until late April or early May and did not appear disturbed by the presence of human observers (Magun 1985). ... Finnoscandian studies report den abandonment as a common

> response to human disturbance. ...Myrberet (1968)mentions 4 instances of den abandonment due to human disturbance and suggests that secondary dens may be less suitable. My data is consistent with this. My first direct contact with denning females did not occur until late April and resulted in immediate den abandonment.(p. 93)

Copeland's thesis (1996) also relates an anecdote of a mother wolverine who discovered the researchers' snowshoe tracks near her den, followed them to within 20 m of the researchers, immediately returned to her den and took off in the opposite direction with a kit in her mouth. She returned 30 minutes later to repeat this with her second kit (pp. 96-97).

As mentioned above, Researcher John Krebs recently related an anecdote whereby a helicopter skiing operation appeared to displace a female wolverine 10-15 kilometers from her newborn kits.

Based on his observations, Copeland (1996) concludes that adequate wolverine denning habitat, secure from human disturbance, is critical: "Central Idaho wolverines appeared highly selective in choice of natal denning and kit rearing habitat. ...Even with adequate food, wolverines may not be resident without suitable denning habitat" (p. 72). Further: "When viewed in conjunction with potential displacement and disturbance of denning females by winter recreational activities of humans, denning habitat may be a limited and critical component of wolverine habitat" (p. 93). Copeland (1996) proposes some management recommendations that

incorporate this conclusion:

> Protection of natal denning habitat from human disturbance is critical for the persistence of the wolverine in Idaho. The clear association between wolverine presence andrefugia may be strongly linked to a lack of available natal denning habitat outside protected areas. ... Technological advances in over-snow vehicles and increased interest in winter recreation has likely displaced wolverines from potential denning habitat and will continue to threaten what may be a limited resource.
>
> ...
>
> Subalpine cirque areas important for natal denning may be made unavailable by winter recreational activities. Conversely, high road densities, timber sales, or housing developments on the fringes of subalpine habitats may reduce potential for winter foraging and kit rearing and increase the probability of human-caused wolverine mortality. (pp. 129-130)

Protection from Landscape Fragmentation

We also know from the science of conservation biology that small populations must receive high rates of immigration and emigration to guard against extirpation, due to demographic, genetic, and environmental stochasticity. The more obstacles to wolverine movement between wolverine populations across the landscape, the higher the risk that individual populations may be extirpated, and suitable wolverine habitat will not be re-colonized (Noss and Cooperrider, 1994; Franklin, 1993; Soule, 1987).

Hornocker and Hash (1981) argue the need for a regional approach to wolverine conservation and management:

> Regional, rather than local, populations must beconsidered in any management program. Our study area was large, relative to that for other species, yet it became clear we were dealing with a local unit of a regional population. Individuals routinely traveled far beyond

> the boundaries we set arbitrarily, but because of logistics, necessarily set. By traveling widely in a short period of time, individual wolverines give a false impression of abundance. Tracks encountered in widely separated major drainages, often divided by high mountain ranges, may in fact be made by the same individual. This should be taken into account when unit or area harvest regulations are set. (p. 1300)

Copeland (1996) mentions the need to protect refugia for wolverines and the need to ensure their connectivity across the landscape:

Refugia may be most important in providing availabilityand protection of reproductive denning habitat. Life history requirements of the wolverine are tied to the presence and stability of ecosystems lacking broad scale human influence. ...Habitat alteration may isolate subpopulations increasing their susceptibility to extinction processes. (p. 130)

Edelmann and Copeland (1999) reached a similar conclusion regarding the need to maintain connections between wolverine populations in Idaho, Oregon, and Washington:

> The lack of previous sightings suggested limited dispersal between Oregon and Idaho. Low dispersal may impact the regional viability of wolverine by lowering the likelihood that suitable habitat patches are inhabited over time. Maintaining and enhancing the integrity of movement corridors between the Seven Devils Mountains and other contiguous mountain habitats in Idaho and Oregon may be essential for ensuring regional wolverine persistence. (Abstract)

Mortality

As with many animals in the wild, wolverines rarely die of old age, and empirical evidence indicates that many of them die earlier than necessary because of the activities of their primary predator, Homo sapiens. Hash (1987) reports

that wolverines in Montana rarely exceed 8 years of age. Other researchers have indicated maximum longevities of eight to eleven years for wolverines in the wild (Hash 1987).

Banci (1994) listed some factors in the natural mortality of wolverines: predation by other carnivores, including mountain lions, perhaps even bears or eagles. Adult males may kill kits, and Banci (1994) mentions the currently popular theory that males (of various species) may kill young to improve their chances of perpetuating their own lineage.

Wolverines may kill each other, especially males during the period of heightened aggression during breeding season. Banci (1994) suggests that disputes between older, established males and young ones may be a factor in "encouraging" the young to disperse, although Copeland's findings of 1996 suggest this may not be a large item, at least during the juvenile/subadult phase. In Copeland's (1996) intensively studied population in central Idaho, "Seven radio-marked wolverines (6 females, 1 male) died during the study period; 3 from predation, 3 of unknown cause, and 1 research related."

Krebs and Lewis (1999) found that six of eleven mortalities detected during their study (as of June 1999) were human-caused, and as mentioned above, they estimated the annual survival rate for all age and sex categories combined at just 0.77 (95% CI: 0.66-0.88). Krebs and Lewis' primary

recommendation is to address the sources of wolverine mortality that can be managed:

> Human-caused mortality of wolverine from trapping and transportation corridors is the largest factor influencing survivorship. Trapping restrictions may be warranted if rates are found to be unsustainable. Tracking harvest sex and age through compulsory inspection would assist management decisions. carrion along the road and rail right-of-ways needs to be disposed of rapidly to avoid collateral kill of carnivores such as wolverine. (pp. 19-20)

Trapping

Trapping is a major source of wolverine mortality in many areas. Banci (1994) reports "Over most of its distribution, the primary mortality factor for the wolverine is trapping. In telemetry studies, trapping has accounted for over half of all mortalities. "

Copeland (1996) adds that "wolverines are most susceptible to trapping during winter months when carrion constitutes most of their diet (Hornocker and Hash 1981, Magoun 1985, Banci 1987). By mid-February parturient females begin to restrict their range to the vicinity of natal den sites, making them less available for capture from late February through May" (p. 30).

Wolverines are particularly vulnerable to trapping because of their scavenging propensities; trap baits are attractive to wolverines, including traps that may have been set for other prey; this, in turn, means that even when trapping of wolverines has been discontinued, trapping can

remain a hazard to the species.

In Montana, Alaska, and Canada the wolverine is classed as a "furbearer"--that is, the animal trapped for its fur. Montana has adopted some regulations for the conservation of wolverine. Before 1975, the species was unprotected; after that, seasons and licensing were instituted as well as a bag limit of one wolverine per trapper per season (Banci, 1994). As of 1999, there is a 10-week season and no statewide quota. Banci (1994) reports on restrictions in adjacent habitat in British Columbia as well: "Beginning in 1993-1994, seasons in southwestern British Columbia were closed, consistent with the view that furbearer populations at low densities in marginal habitats should not be trapped." In other parts of British Columbia and the Yukon, a system of registered traplines, assigned to specific trappers, was implemented to encourage "sustainable" trapping.

Part II: Reasons for Consideration of ESA Listing for the Wolverine

ESA Listing criteria Applied to the Wolverine

The Biodiversity Legal Foundation, Predator Conservation Alliance, Defenders of Wildlife, Northwest Ecosystem Alliance, Friends of the Clearwater, and Superior wilderness Action Network are filing this petition because we believe the wolverine is imperiled and is in immediate need

of protections under the Endangered Species Act. Previous efforts to gain protections for the wolverine have failed because of the difficulty of proving that so rare and mysterious a creature was indeed imperiled.

Perhaps the strongest evidence that the wolverine is imperiled is simply its low numbers, fragmented across a landscape matrix containing developed lands that are unsuitable for wolverines and undeveloped lands that are current or potential wolverine habitat. Maps attached to this petition indicate areas where petitioners believe wolverines still survive (Appendix D). When one considers the low density of wolverines across this area, it is evident that wolverine population sizes are alarmingly low. By comparison with other species, the best available information indicates that there are no more wolverines in the northern Rockies than there are grizzly bears (currently listed as Threatened), gray wolves (currently listed as Endangered), or lynx, for example (currently listed as Threatened). In its favor, wolverines are accomplished dispersers and have the ability to survive in low densities where they can travel between sub-populations without getting killed. Yet escalating development of areas between wolverine habitats, in the form of highways, residences, agriculture, recreation, and ongoing extractive industries, is threatening to isolate and extirpate wolverines from many portions of their former

range.

Bill Ruediger, Threatened, Endangered and Sensitive Species Program Leader for the Northern Region of the U.S. Forest Service, describes the current threat to wolverines and other forest carnivores due to landscape fragmentation:

> The best opportunity for management of a functional carnivore community in North America is the Northrn Rocky Mountains of the United States and the Southern Rocky Mountains of Canada. It may be the last place in the lower 48 states where this opportunity exists. The area extends from the Wyoming Range in Wyoming north to Jasper National Park in Canada (Paquet, 1995). One of the major issues in conservation of carnivores in this area is the expanding highway and railroad system. Another is strip development as humans expand out from towns and cities.
>
> ...
>
> As the highway system (and railroad) grows in size, traffic volume and total miles, its impacts on wildlife will grow. The impacts on low density carnivores like grizzly bears, wolves, lynx, wolverine and fisher will be more severe than [on] most other wildlife species. This is due to their large home ranges, relatively low fecundity, and low natural population density. The adverse effects of highways to rare carnivores and other wildlife include serious habitat fragmentation, mortality, direct loss of habitat, displacement from noise and human activity and secondary loss of habitat due to human sprawl (Ruediger, 1996; 1998).
>
> When traffic volume increases, there is an evolution of highways from gravel roads to paved two lane roads, and from two lane highways to more problematic four lane highways and "super highways" like the Interstate system. The eventual result of such a progression in the highway system on rare carnivores is the slow strangulation of viability due to population isolation, loss of habitat, mortality of individuals, and a decline in potential population size. All of these factors are primary causative agents in the decline and extirpation of wildlife worldwide.

1. Destruction, modification, or curtailment of habitat or range

As described in Part I of this petition("Distribution, Historical and Current"), wolverine range and numbers had declined dramatically by the turn of the twentieth century, and populations still have not recovered. Not only are current population numbers perilously low, there is evidence of declines in number and distribution over the past few decades as well. Also described in Part I above ("Habitat Requirements"), the imperiled status of the wolverine is most likely due to failure to provide the species with several critical needs: large areas free from human disturbance, protection from disturbance at their natal dens especially, and freedom to travel between subpopulations that are both naturally and artificially fragmented.

Decline of Areas Free of Human Disturbance

There is clear evidence concerning the loss of road less areas in current and former wolverine range within the contiguous United States. The development of National Forest lands for timber extraction practices began in earnest in the 1960s throughout wolverine habitat in the U.S. northern Rockies and Northwest and continues in these same areas today. For example, the 1979 Targhee Forest Plan states (p. 92): "Until 1960, there had been minor timber harvesting activity on the Targhee ...the Targhee sold a sale containing 318

million board feet (MMBF) of timber in 1960, the largest single timber sale in the continental United States at the time." The volume of timber logged every year on the Targhee increased steadily since 1960 and peaked at more than 100 MMBF during 1988 (USFS, 1992, 1982).

An assessment by the Montana Wilderness Association demonstrates the decline of roadless areas in the last remaining wolverine stronghold in northwestern Montana. These data indicate that between 1940 and 1994 roadless areas in this area declined more than 50% (from 6.9 million acres to 3.3 million acres). Of the 3.3 million acres that remained roadless in 1994, nearly 2 million acres (60%) were unprotected from development.

A more recent assessment by researcher Kim Davitt of the Bozeman, Montana-based conservation group, American Wildlands, documents similar declines in roadless areas across the entire northern Rockies region (Davitt, 1997, Appendix I). Davitt found that according to data from the U.S. Forest Service, since the forest planning process (early to mid1980s), more than 440,000 acres of inventoried roadless lands have been developed on Forest Service holdings in the northern Rockies. She also notes that this figure is likely to be conservative, since a study by The Wilderness Society (Anderson, 1997, Appendix Q) determined that one million acres

of roadless area have been developed in Idaho alone since that time. Davitt specifies the loss of roadless acres by National Forest, and it is evident that many of the losses are coming from prime wolverine habitat, such as the Beaverhead, Gallatin, Helena, and Lolo National Forests in Montana and the Boise, Idaho Panhandle, Palette, and Salmon-Challis National Forests in Idaho (Appendix I, Table 1; data on wyoming's National Forests were not available). It may be more than a coincidence that large portions of two National Forests in Montana that have developed the most acres of road less lands--the Beaverhead and Lolo National Forests--no longer receive wolverine observations (see Part I of this petition, "Current Distribution, Montana"; Appendix D).

The threats to roadless lands in the northern Rockies continue today. Davitt cites a 1997 press release by the Idaho Conservation League which states that more than 100 new timber sales were proposed during the next five years in Idaho alone: "these projects. ..will develop more than 250,000 acres of roadless lands and add 262 miles of roads to the National Forest road network" (Appendix I, p. 4). A current proposal by the Clinton Administration to protect roadless areas in the National Forests may eliminate many of these ongoing threats to wolverine habitat, but it is still far from ratification and implementation.

Threats to Denning Habitat

A recent survey for wolverine denning sites on the Island park Ranger District of the Targhee National Forest found a potential wolverine den in the only alpine cirque habitat inaccessible and therefore untracked by snowmobiles (K. Heinemeyer, pers. comm., Western Forest Carnivore Committee Conference, May 2000, May 1999). This is current anecdotal evidence to support the threat posed to wolverines by snowmobiles and other winter recreationists documented by Copeland (1996), Krebs (1998), and others.

Data compiled by the Montana Department of Fish, wildlife and Parks demonstrates extensive use of snowmobiles in Montana and dramatic increases in snowmobile use since the 1970s. The numbers of snowmobiles registered each year in Montana has increased approximately 50% during the past decade, from just over 15,000 in Fiscal Year 1991 to 22,600 in FY 1999 (B. Walker, State Trails Program Coordinator, Montana Dept. of Fish, wildlife and Parks, pers. comm., November 1999; Appendix U). Since not all machines are registered and more than one person may ride each machine, these figures are conservative. A recent report (Sylvester, 1998; Appendix V) estimates that in 1998 about 12% of Montana's households ride snowmobiles, or nearly 100,000 Montanans each winter. This does not include the many visitors from out of state who snowmobile in Montana as well.

Additional data from the Montana Dept. of Fish, wildlife and Parks indicates that the money spent grooming trails for snowmobiling in Montana has increased by more than ten times during the past two decades: from less than $30,000 in 1978 to nearly $400,000 in 1999 (B. Walker, pers. comm., November 1999; Appendix V). Another important factor when considering the increased threats posed by snowmobiles to wolverines over time are the advances in snowmobile technology which have
resulted in far more efficient and powerful machines that are able to access many areas of wolverine habitat that were previously inaccessible.

Furthermore, snowmobile use is certainly occurring in areas where they may adversely affect denning wolverines. Biologists on the Lolo National Forest recently modeled the overlap of snowmobile use and potential wolverine den sites within the "Statelier" area of the forest, and found that the area contains about 38% of the cirque basins (habitat known to be selected by denning wolverines) found on the entire forest. Under a "no-action" alternative, 100% of these areas would be open to snowmobiles; under an alternative that continues to allow snowmobiling to occur in areas "commonly used by snowmobilers," 52% of the potential wolverine habitat is open to snowmobiling (USFS, 1998).

Landscape Fragmentation

Bill Ruediger, Threatened, Endangered, and Sensitive Species Program Leader for the Northern Region of the U.S. Forest Service, explains the problem of landscape fragmentation due to transportation corridors and associated developments on the wolverine and other wide-ranging forest carnivores (1996):

> Landscapes required to sustain populations of mid- and large-sized carnivores are unknown--but likely immense when considering expanding human populations. [The] World wildlife Fund (Paquet, 1995) and the Western Forest Carnivore Committee estimate that a functional ecosystem for carnivores in the Northern Rocky Mountains probably needs to include a landscape from west-central Wyoming to mid-British Columbia and Alberta. In such a situation, carnivores would be required to cross at least 4 highways in Wyoming, 17 highways in Idaho (including 2 Interstates), 23 in Montana (including 2 Interstates), and 17 in British Columbia and Alberta (including the TransCanada Highway). This totals 61 highways for one population of carnivores. The Region is experiencing increased tourism, commercial and residential traffic volumes, and highways are being upgraded and added to the system at an unknown rate.

Ruediger et al. (1999) assess the current landscape fragmentation problem in Montana and Idaho:

> ...The [land] ownership pattern is particularly problematic in western Montana, where mountain ranges are largely National Forest land, but the surrounding valley bottoms are mostly private lands. The private land is increasingly subject to subdivision, suburban sprawl and other uses incompatible to long-term maintenance of wildlife habitat connectivity. Once the private lands are fully developed, western Montana will have only three large areas of carnivore refugia (Greater Yellowstone Area, Selway-Bitterroot Mountains and the Bob Marshall Wilderness-Glacier Park areas), with the remaining public land habitat in between these areas existing as II island II mountain ranges surrounded by developed private land.

> ...In northern Idaho from Coeur d'Alene north, keylinkage areas between the Selkirk Mountains, Cabinet Mountains and the Bitterroot Mountains are at risk and will require restoration. In western Idaho, linkage to the Wallowa and Blue Mountains in Oregon and Washington is at risk or absent. In eastern Idaho, Interstate 15 provides a formidable barrier between the Greater Yellowstone area and Bitterroot Mountains.

British Columbia resarcher John Krebs provides some empirical data to validate Ruediger's concerns with respect to the wolverine. His preliminary data indicate that the TransCanada Highway is a barrier to movement for all but one of the wolverines in his study area (J. Krebs, pers. comm., Western Forest Carnivore Committee Conference, May 1999).

A recent assessment of private lands development within the Greater Yellowstone Ecosystem (GYE) found four significant trends, all of which have the potential to jeopardize connectivity between wolverine populations surrounded by private lands (Johnson, 1999; Appendix P):

> 1. The pace of development in the 1990s in the GYE is occurring at levels unprecedented in the last 24 years [1975 was used as a baseline in this report, the year
> that the grizzly bear was listed as "Threatened"].
> 2. Data indicate that in 7 GYE counties. ..a sizable portion of private county land that has not yet been built upon (i.e., that appears vacant) has already been approved for development.
> 3. In many GYE counties, development increasingly appears to be preferentially occurring in the rural county areas rather than clustering near cities and towns.
> 4. Development appears to be concentrating in areas of critical wildlife habitat, notably riparian corridors.

2. overutilization for commercial, recreational, scientific, or educational purposes

The Hudson's Bay Company's 1836-1853 records illuminate what accounted for the initial loss of the wolverine: indiscriminate trapping in the nineteenth century. Another major factor was the use of poison across the landscape to kill wolves, coyotes, and other predators. As wide-ranging scavengers, wolverines are particularly susceptible to poisoning, either by preying on the baits themselves, or scavenging on carcasses of other predators that contained residual poisons in lethal doses. The literature indicates that the combined effects of trapping and poisoning had reduced the wolverine to extirpation or near extirpation in all but one or two areas in the western U.S. by the early twentieth century.

Trapping has been a factor in wolverine declines in recent decades as well. As mentioned above, in the early 1970s, more than 500 wolverines were trapped for three consecutive years in British Columbia, and wolverine numbers have been declining ever since (J. Krebs, pers. comm., Western Forest Carnivore Committee Conference, May 1999). Hornocker and Hash (1981) reported that 15 of 18 recorded mortalities during their study were removed by commercial trappers during the five winters of their study. As mentioned above, data on the number of wolverines killed in Montana prior to 1984 is

lacking, but Hornocker and Hash {1981) reported that many wolverines were killed by humans up until 1975 when the wolverine received some state protections: "The annual take has declined markedly despite the fact that some wolverines are trapped incidentally to the taking of other furbearers" {p. 1299).

Not only does this quotation from Hornocker and hash indicate high levels of intentional killing of wolverines in Montana prior to 1975, it also indicates the ongoing problem of incidental human-caused wolverine mortalities. Incidental death due to traps and poisons set for other species remains a threat wherever they are permitted in wolverine range, because of the wolverine's propensity to investigate attractants. Even a small amount of trapping mortality in a small, low-density population may jeopardize its survival. For example, Krebs and Lewis {1999) detected eleven wolverine mortalities by Spring 1999 of their study, six of which were human-caused. Krebs stated at a recent conference that human-caused mortalities continue to be a primary concern, and are likely causing a population decline {Pers. comm., Western Forest Carnivore Committee Conference, May 2000). Traps and poisons set by government trappers and private ranchers as well as commercial and recreational trappers are still common across wolverine range and may pose a significant threat to wolverine survival and recovery in some areas.

3. Disease or predation

The literature suggests that disease is not a problem for wolverines, although the species' already low reproductive rates may be further hampered by malnutrition of the females. No diseases have been identified as attacking wolverine populations.

Predation may be a problem in some areas, since, according to Banci (1994), wolverines are sometimes killed by wolves, mountain lions, and other large predators that the wolverine follows to obtain food. While this may be a significant source of mortality in some areas, it is also evident that the beneficial effects of these predators providing carrion for wolverine outweighs the negative effects of mortality, and thus healthy populations of these species should be encouraged throughout wolverine range (e.g., E. Lofroth, B.C. Ministry of Environment, pers. comm., Western Forest Carnivore Committee Conference, May 2000).

4. Inadequacy of existing regulatory mechanisms

Despite attempts to have the wolverine listed for protection under the ESA, the species is presently without federal standing of any kind other than Forest Service and Bureau of Land Management designations. The wolverine is listed as "Sensitive" in U.S. Forest Service Regions 1, 2, 4, and 6; and "Proposed Sensitive" in Region 5 (Butts, 1992).

Likewise, the U.S. Bureau of Land Management (BLM) has classified the wolverine as "Sensitive" (Butts, 1992). The wolverine was classified as a Category 2 candidate species for listing by the U.S. Fish and Wildlife Service, but this classification was eliminated in 1996. The wolverine is not on the current "candidate species" list, recently published by the U.S. Fish and Wildlife Service (63 Fed. Reg. at 57534).

While there is some direction for the Forest Service and BLM to protect species and their habitat classified as "Sensitive," it has not resulted in on-the-ground protections for wolverines to date and has not been adequate to recover the species since its historical lows in the early 1900s. As mentioned above in Part I and the attached maps (Appendix D), there is increasing evidence of recent wolverine declines over the past several decades as well.

Lacking federal protections, the responsibility for wolverine conservation and management falls on the states. The states have had limited success protecting wolverine habitat because of their lack of authority over the major part of the wolverine's range, managed by the U.S. Forest Service (except for state-designated "wildlife management areas" that benefit wolverines indirectly by providing habitat security for predators and prey alike). The only direct protections for wolverine have been restrictions and closures of wolverine trapping which can best be characterized as "too

little, too late." A bag limit of one wolverine per trapper was implemented in Montana in 1975 but given the low population numbers of wolverines in increasingly isolated mountain ranges across western Montana, there is considerable doubt that even the low numbers of wolverines that are still legally trapped every year in Montana are sustainable. The trapping season for wolverine closed in Idaho in 1965, and this may have slowed the current decline of wolverine in Idaho as compared to Montana. without habitat protections--such as security for den sites in areas receiving increasing winter recreational use--the trapping prohibition is not adequate to restore wolverines in Idaho.

5. Other natural or manmade factors affecting its continued existence

A combination of ecological factors is worth noting here that result in the wolverine's vulnerability to extinction. For the wolverine, these consist primarily of the species' low reproduction rate, its sensitivity during denning, and its need for large areas of un fragmented range and habitat.

Summary and Conclusion

Wolverine Status in summation

Wolverine distribution and abundance has been reduced in the continental United States from a contiguous population

that ranged the entire northern tier of states to 800 or fewer animals fragmented across six or more populations centered in western Montana and Idaho and potential remnant populations scattered across the mountainous areas of Washington, Oregon, and perhaps California.

Several ecological factors jeopardize wolverine survival and recovery, including their large home range requirements, slow reproductive rate, and sensitivity to human disturbance. Human activities and developments that directly threaten wolverine survival and recovery include the loss and destruction of roadless areas, disturbance of denning habitat by winter recreation, and fragmentation of wolverine subpopulations by development of private lands and transportation corridors in the areas between existing and potential wolverine habitat. Direct and incidental mortality of wolverines due to traps and poisons was a major cause of the decline of wolverines historically, and continues to be a threat in some areas of the wolverine's range today.

The Reasons for ESA consideration of the Wolverine in Summation

1. The wolverine, like most other imperiled native American species, suffered grave losses of habitat during the western settlement of the contiguous United States. The future threatens steadily increasing loss of habitat for the wolverine because of much increased human intrusion into the

undisturbed wilderness where it lives. Wolverines have been neglected in forest planning in which their persistence is traditionally taken for granted. Only recently have observation data raised red flags regarding current declines in the species, including a paucity of observations throughout areas as broad as, the Sierra Range in California and as specific as Ted Turner's 120,000 acre ranch in the northwestern portion of the Greater Yellowstone Ecosystem. The primary causes for these and other ongoing declines appears to be failure to provide the wolverine with large areas free from human disturbance, failure to protect wolverine den sites in particular, and failure to protect key linkages between wolverine subpopulations.

2. Severe overtrapping and poisoning during the nineteenth century was probably the primary reason for the wolverine's decline historically. Unregulated killing that continued throughout much of this century may have contributed to more recent declines. Ongoing legal trapping in Montana and incidental trapping mortalities incurred in the trapping of other species in wolverine range, in addition to ongoing use of poisons may continue to jeopardize the survival and recovery of wolverines in many areas.

3. Wolverines are sometimes killed by the larger predators they follow to find food, but managers have limited ability to address this problem.

4. Lack of ESA protection to date has failed to address site-specific threats to wolverines (i.e., developing roadless areas and winter recreation in denning habitat among others) and has also precluded conservation and management strategies on the multi-state, regional scale which are necessary for the preservation of such a low density, wide-ranging species.

5. The wolverine is naturally vulnerable to extinction because of its low reproductive rate, sensitivity to disturbance during denning, and need for large areas of undisturbed habitat.

Additional Notes

It is worth mentioning that the wolverine is, as are other forest carnivores--the lynx, fisher, and marten--an indicator of ecosystem integrity. A remarkable animal worth conserving in its own right, the wolverine also serves as a valuable indicator of the predator community and ecosystem processes it depends on for survival. Thus, efforts to protect the wolverine will promote the conservation and restoration of the entire boreal forest ecosystems where it lives.

It is also worth reiterating that although previous efforts to protect the wolverine have failed due to a lack of scientific data, the data are indeed accumulating. Today, thanks to the dedication and hard work of a handful of field

biologists (e.g., Vivian Banci, Jeff Copeland, Howard Hash, Maurice Hornocker, John Krebs, Eric Lofroth, A. Magoun, W. Zielinski, and others), our knowledge of wolverines is considerably more complete than it was just a few years ago, and it continues to grow. Petitioners urge the u.S. Fish and wildlife Service to make an ESA listing decision based on "the best scientific or commercial data available."

The Cultural Importance of the Wolverine

It would be inappropriate to close this petition without mentioning the cultural importance of the wolverine to the American people. According to American folklore, the wolverine is an almost supernatural animal of great ingenuity and fighting ferocity. Wolverines have been believed to be tough and aggressive enough to take carcasses away from wolves and bears, and if wolverine gossip is to be believed, its "opportunistic" feeding habits can include tidbits of steel traps. The wolverine is an all-American totem animal, a unique cultural property of the United States. Even though Michigan wildlife authorities today dispute the historical abundance of wolverines in Michigan, the animal early attracted considerable attention in that state and nationwide. We know, for example, that George A. Custer of Michigan began calling his cavalry brigade "The Wolverines" as early as the second year of the civil War (Monaghan, 1959), and today the

University of Michigan's football team and any number of high school athletic teams across the country have named themselves "Wolverines" even though most Americans have never seen a wolverine. The United States now has the responsibility to ensure that the wolverine--an American icon of fight and indomitability, of determination and survivorship--does not fade into the realm of myth and legend, but instead remains a living, breathing, snarling component of our precious natural heritage.

Respectfully submitted,

D. C. "Jasper" Carlton
Executive Director
Biodiversity Legal Foundation
P.O. Box 278
Louisville, CO 80027-0278
Tel: 303-926-7606

David Gaillard
Forest Predator Coordinator
Predator Conservation Alliance
P.O. Box 6733
Bozeman, MT 59771
Tel: 406-587-3378

Mike Senatore
Defenders of Wildlife
1101 14th Street, N.W.
Suite 1400
Washington, D.C. 20005
Tel: 202-682-9400

Mitch Friedman
Northwest Ecosystem Alliance
1421 Cornwall Ave., Ste. 201
Bellingham, WA 98225
Tel: 360-671-9950

Ray Fenner, President
Superior Wilderness Action Network
2052 Carroll Avenue
St. Paul, MN 55104
Tel: 651-646-6277

Gary Macfarlane
Friends of the Clearwater
P.O. Box 9241
Moscow, ID 83843
Tel: 208-882-9755

Copy: Eric Glitzenstein, Meyer & Glitzenstein